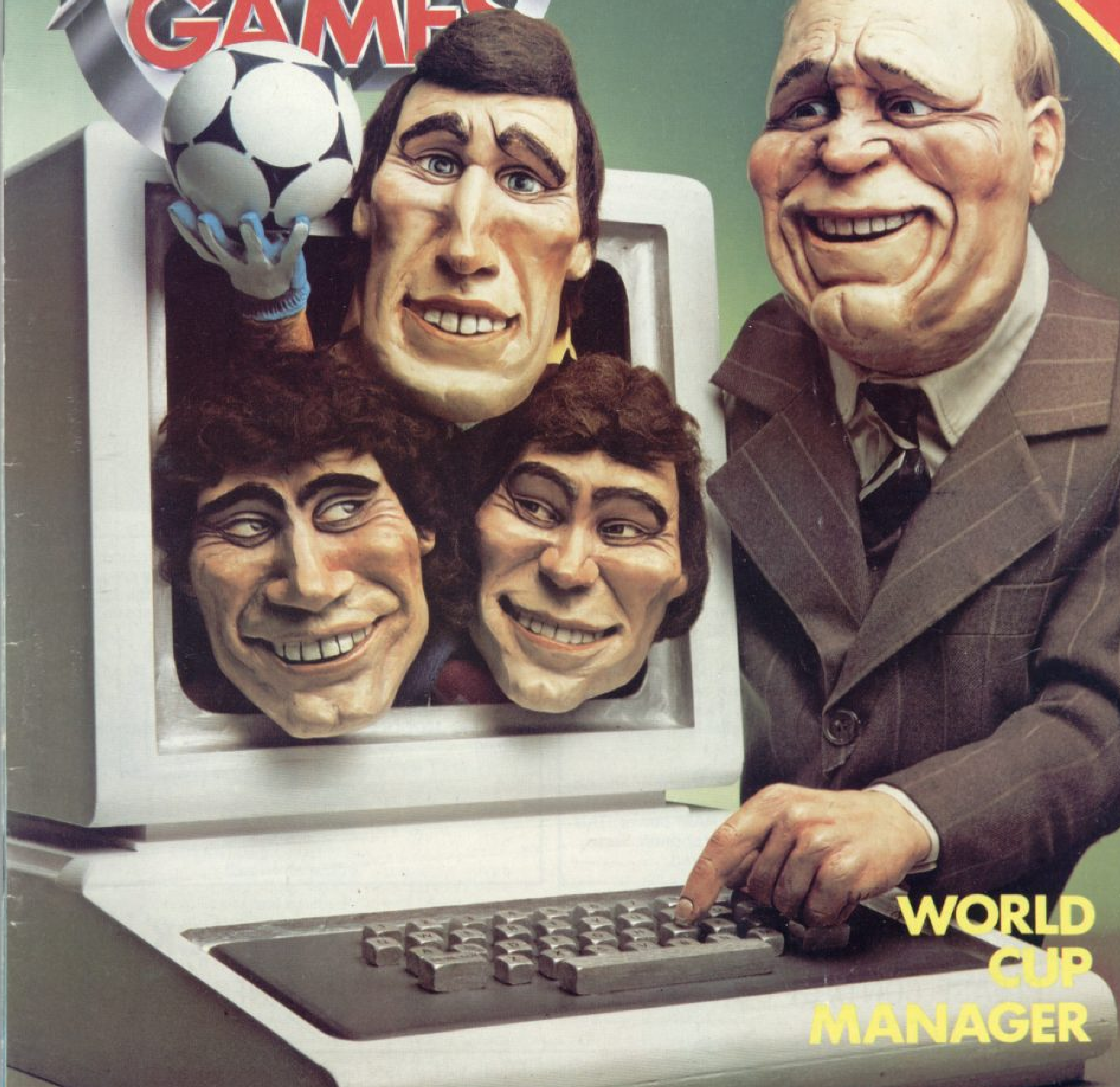
JUNE 1982
75p

COMPUTER & VIDEO GAMES

OWL
THE BBC MICRO MAGAZINE
ISSUE ONE INSIDE



WORLD CUP MANAGER

EVERYONE'S A WINNER
In our Atari Games Centre World Cup Competition

SOLVE OUR FREE PUZZLE
AND WIN A BBC MICROCOMPUTER

CONTENTS

JUNE 1982 No 8



World Cup

Halftime in the World Cup semifinals and you're 2–0 down to Czechoslovakia . . .

If you thought that was the kind of pressure which could only be put on Ron Greenwood this summer, you hadn't reckoned with our World Cup Manager game. It runs on the Sharp MZ-80K but without a PEEK or a POKE so anyone with enough memory should be able to convert it.

Your task is to try and win the World Cup, with Brazil it's hard. With El Salvador, it's heartbreaking — but just about possible.

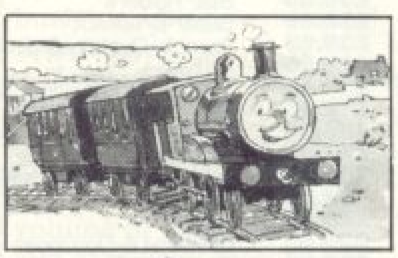
This is your chance to get Over the Moon or Sick as a Parrot even before the World Cup proper kicks off. Page 32.

News & Reviews

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Features

Editor Terry Pratt, **Assistant editor** Elspeth Joiner, **Editorial assistant** Susan Cameron, **Design** Linda Freeman, **Production editor** Tim Metcalfe, **Advertisement manager** Rita Lewis, **Advertising executive** Neil Wood, **Advertisement assistant** Louise Flockhart, **Publisher** Tom Moloney

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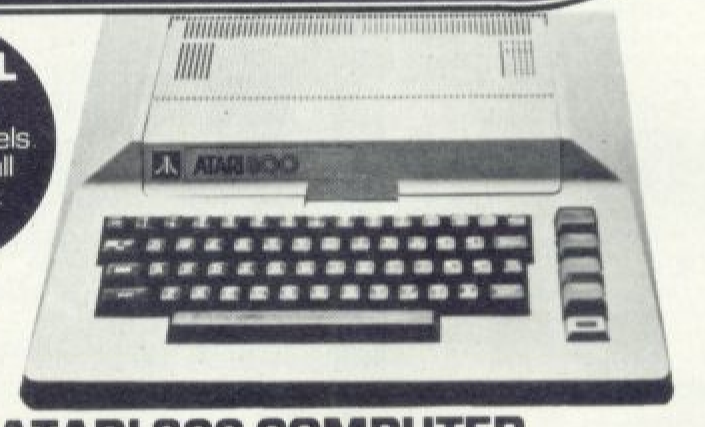
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Cover: Model — Dorian Cross Photograph — Geoff Howes

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Visicalc	DISK	**£119.95**
Home Financial Management	CC	**p.o.a.**
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CC = Compact Cassette
ROM = Plug-in ROM cartridge
DISK = Floppy Diskette

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SINCLAIR'S NEW BABY

Dear Sir,
I have heard a good deal about the coming of a Sinclair ZX82 microcomputer. Is it going to be out this year and if so will it be compatible with the ZX81. If we ZX81 users can't upgrade our machines into ZX82s, then how much will this new one cost. Please can you help as I have read so many confusing reports about this machine.
T. Robinson,
Saffron Walden,
Essex.

Editor's reply: The ZX Spectrum has already gone into production at the rate of 20,000 units a month. Clive Sinclair said it would be available to the public within a fortnight of ordering the machine.

It is on sale in two versions. The 16K memory computer sells at £125, while the 48K machine costs £175 inclusive of VAT. If you want to upgrade the 16K version you can do so by buying an internal expansion board which will cost about £60.

The ZX Spectrum isn't compatible with the ZX81 at present, but all the 81 software will run on the new computer with minor variations. It is only slightly larger than the ZX81 with a calculator type keyboard instead of the sensory keys featured on the ZX81.

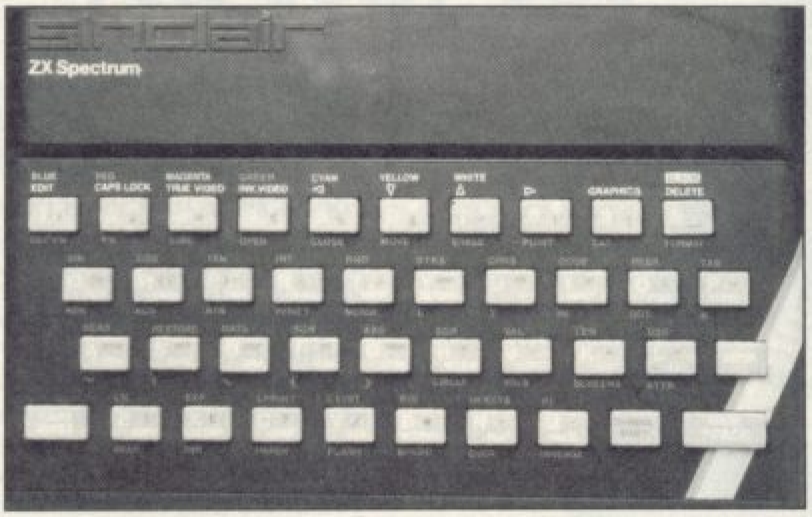
The ZX Spectrum incorporates high resolution colour graphics, more memory capacity, a sound generator, a 40 key ASCII keyboard and upper and lower case.

Not only is it compatible with ZX81 software it also has a special port for linking up the Sinclair printer, and can be plugged directly into an ordinary PAL television set.

Clive Sinclair claims the Spectrum is more powerful than most of the microcomputers now on the market — including the B.B.C. models A and B.

The most interesting part of the new computer is the disc drive called the ZX Microdrive, which will be available for the machine in a few months time. Measuring about 4" × 4" it will provide data storage on floppy discs, and the units can be stacked onto each other giving extra capacity.

Altough there is no software specially for the Spectrum at present Sinclair plans to introduce some later.



The Sinclair Spectrum

SELLING SOFTWARE

Dear Sir,
I am writing to enquire whether or not there is any law preventing the sale of software from a private residence. I have written several enjoyable 16K ZX81 games — including a graphics-adventure — a home management program and a wages calculation program, which I am considering selling on tape, from home, or if some law prevents this, to a software purchasing company, the quality hopefully being high enough for them.

Please could you tell me how much, on average, these companies pay, and if there is any law concerning the first part of my letter?
Gary Coxon,
Caverswall, Staffordshire.

Editor's reply: The only thing that could affect your private sales is the mortgage or rental agreement covering the residence. It might be wise to check this. At the same time you could find problems with the local rating authority if they consider that the volume of business has changed the basic use from residential to business.

However, I doubt if you'll do enough business to worry them, or the VAT man either. You could find problems though if the volume of trade caught the eye of the tax man.

DEALER'S DILEMMA

Dear Sir,
In recent months, we have advertised our Byg Byte 16K Ram Pack in your magazine and in this advertisement we stated that delivery could be expected within 28 days.

However, during the past six weeks, many people who have ordered these Ram Packs have had to wait longer than the stated 28 days due to circumstances beyond our control. Over 25 per cent of the initial batch which we despatched were damaged beyond repair by the Post Office and this has necessitated our having the packaging redesigned which caused the delay.
J. G. Lane,
Computer Aided
Printing Services,
Petersfield, Hampshire.

AUNTIE'S MICRO

Dear Sir,
I have received your magazine since the first issue, and have noted that there have been no programs dedicated to the B.B.C. micro.

At the moment I am awaiting delivery of my model B, and feel that it is a great pity that this micro seems to have been overlooked within your pages.
K. Stephenson,
Cockermouth,
Cumbria.

Editor's reply: After a slow start, there are now enough B.B.C. Microcomputers finding their way out to the public to justify publishing listings for this machine. Far from "overlooking" the machine we have been very conscious of the need to cover it but felt we had to wait until sufficient machines were available. Turn to the centre of this magazine Mr Stephenson for our first look at what is going to be a very popular microcomputer.

The best enhancement yet for the ZX enthusiast - for just £9!



What is the best way to guarantee that you never become bored with your Sinclair computer?

The answer is to subscribe to Sinclair User ... written specifically for owners of ZX 80's and ZX 81's. Sinclair User is the latest monthly from ECC Publications - pioneers of Practical Computing, WHICH COMPUTER?, and Computer & Video Games. Whether you bought your system yesterday or are an old hand, you are probably an enthusiast for your machine. And your biggest problem is likely to be obtaining all the information to satisfy your interest. We promise that Sinclair User will be devoted entirely to quenching your thirst for information.

Issue one is Published on 1 April and is an absolute must for Sinclair devotees. So make sure **you** guarantee that you get **your** copy by taking out a subscription **now.**

As the name suggests, the content will be geared specifically to helping the user. There will be pages of information on available hardware and software. Our expert writers will analyse established products to help you make the right choice. There will be exclusive pre-release snippets on products which are about to hit the market. Our aim is to make Sinclair User invaluable and we will chronicle applications which are of special interest.

For example, in the first issue we will look at business applications and we visit a school where the pupils are having the time of their lives using their Sinclairs. Each month we will carry eight pages of programs. Another must for every user is our first-rate helpline service. And we intend to carry as much information as possible about clubs.

Last but not least let us say that the best way you can guarantee you like the magazine is by participating yourself. Don't forget to ask us your queries; send in your programs - for which we will pay £10 if we publish and be sure to tell us if you are using your ZX 81 in a special way. Send in your club news and tell us of any interesting people out there in userland. And just in case you need further convincing, look at the editorial plans for the first six issues.

Can you continue to get the most out of your ZX without reading the Sinclair User? So why not fill in the subscription order form **today?**

Editorial Plans

April

Hardware overview
Software overview

May

The Sinclair 16K RAM dissected
Adventure games programs

June

Disks - a look into the future
Graphics software

July

The ZX81 memory map analysed
Debugging programs

August

The Sinclair printer and its alternatives
Chess programs

September

Enhancements for the enthusiast (e.g. colour, sound, high resolution, speech)
Business software for the ZX81

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MAILBAG

CRASHING PROGRAMS

Dear Sir,
I happen to be one of the many people who received a ZX81 for Christmas. When I key-in one of the games for the ZX81 and start playing, the system quite often crashes, why? If it is because it needs a larger heatsink then tell me what a heatsink is and where to get one.

When trying to program a Breakout game, I managed to get a ball bouncing around the place and get a bat at the bottom but then I ran out of memory. Could you please put in your magazine an article on saving space specially for the 1K ZX81?

Also on the side of the ZX81 there are some holes for plugs, two of them are for recording but the cassette recorders I have access to have a five-pin socket. Could I take the ZX81 apart and fit a new five-pin socket? I already have a line.

I. Sabone,
Walmer,
Kent.

Editor's reply: You don't say whether you are using a RAM pack. If not, then there is something wrong with the system and it should be exchanged. If yes, then make sure that it is well supported and does not get moved whilst in use. A momentary disconnection at the rear will lose all data.

The ZX81 needs a fairly high input/output voltage for record/load. A five-pin DIN socket, as you describe, would probably not give an adequate signal. You must use a tape recorder with phono sockets — just like the ones on the computer.

GETTING IT TAPED

Dear Sir,
I am the satisfied owner of a ZX81, finding it more than ample for a home computer. I now wish to purchase a tape recorder solely for use with the ZX81 and wonder if you could advise me on the best machine to buy.

I would be interested to know if the Vic cassette unit would be compatible with the ZX81 and if I could expect better reliability than with ordinary tape machines.

P. Mooney,
Orpington,
Kent.

Editor's reply: There are several cassettes on the market, but if you want to be sure about compatibility it is best to get one which was built for use with the ZX81. The ECR81 Enhanced Certified Recorder is available from Monolith Electronics at 5/7 Church Street, Crewkerne, Somerset.

I know better than to say that it is impossible to interface the Commodore cassette unit onto the ZX81 but it would be difficult in the extreme. The unit was built especially for Commodore products. It is best, and more reliable, to use the recorders recommended by Sinclair. If you want a list of these you should get in touch with Sinclair Research.

OF REMS AND ROMS . . .

Dear Sir,
I am only 13 years old and I took up computing when I first saw your excellent magazine in my newsagents.

I have a few questions to ask. In programs containing machine-code I have seen the particular machine-code routine stored in REM statements but I thought that REM statements were ignored by the computer, so how is the machine-code carried out?

I am thinking of purchasing a new 4K graphic ROM module from DK'Tronics. I have heard that it contains a full set of Space Invaders graphics characters, and I am wondering if you could print an Invaders' program for people with this ROM?

Would it be possibe to adapt my ZX81 to colour? If not I would like you to congratulate the artist who drew the picture in the Sinclair advertisements, because it is extremely realistic!

Would you please tell me which is better, the Sinclair ZX81 or the Acorn Atom. This is a source of excessive arguments between myself and my friends. I don't care what answer you give but please give one!

I think the ZX81 is extremely good value for money because you can buy a ZX81 complete with 16K-byte RAM pack and printer for approximately £170.00 and this is just over the price of a ready assembled 2K Acorn Atom.

Also, although the Sinclair manual is very comprehensive, is there any book I could get which goes into everything?

One last question, Is it possible to get a keyboard for the ZX81 with a case that it can fit inside. I like this idea because I think it will look better and improve your programming speed.

M. Sacaloff,
Bury,
Lancashire.

Editor's reply: The ZX81 has an interesting way of using REM statements when in line 1 of a program. Any data after the REM are put into a special buffer in the memory.

No doubt when a number of people have purchased the DK'Tronics ROM sufficient programs will become available.

The extra cost involved in adapting your machine to colour would probably not justify the adaption. If Sinclair bring out a colour machine later this year it will probably use ZX BASIC — so upgrading to that would be a better bet.

There are so many books on the ZX81, and most of them leave much to be desired. You will probably have to buy three, or four, to cover most of the possibilities available.

If you look through this, and other magazines, you will see at least six manufacturers of keyboards. Most supply cases to take the ZX81 boards, and at around £30.

PROGRAMS ON SCREEN

Dear Sir,
The Games News, Arcade Action, Video Screens and Software Reviews of your magazine are really good and so are the drawings but couldn't we have some photographs of the actual program while it is running? This could also help would-be buyers on which hardware to buy.



Finally, who is the little man holding the book on your January issue with the big snout?

Mr D. Sinden,
Stroud,
Kent.

Editor's reply: Game graphics have not always been as exciting and colourful as we might wish. And our early decision to use illustrations instead of screen photographs was based on a belief that through drawings we could capture more of the theme a programmer originally hoped to portray before he was forced to compromise because of limited graphics facilities.

Screen graphics are now reaching new standards and in the future we will not be sticking so rigidly to the illustrations-only policy.

The characters featured on our covers are entirely fictional and any resemblance between the little man with the big snout and persons, living or dead, is entirely coincidental.

TITIONCOMPETITIONCOMI

Can you Beat The Bug on our give-away front cover puzzle and win a BBC Microcomputer?

A much-sought-after BBC micro will be despatched to the winner of our Beat-the Bug competition.

The puzzle can be done without a computer. Just punch out the small tokens on the bottom of the card and place them on the puzzle as indicated. Then the task is to move the data from computer Z into computer A and replace it with the data from computer A.

But there is a Bug floating about to make things awkward. The rules of the puzzle are:

- Move two pieces of data first, then move the Bug.
- From here data and Bug are moved alternately.
- Data can only move towards its destination.
- Only one piece can occupy a location at any time.
- The Bug can move in either direction.
- Moves are along the lines to neighbouring locations.

It may look deceptively easy but it does take some careful thinking to work out the answer. More importantly it should take a good deal of careful thought before attempting a program to solve it. It is more difficult than the four octagons puzzle we set you with in our first issue. The response to that first puzzle took us by surprise — we weren't expecting 800+ solutions — but this time we think we're ready for you.

We are working out a reasonable time to solve the puzzle so please write on your program how long it takes to come up with the answers.

The objectives are first: to produce the best program to solve the puzzle; to find out how many solutions there are; to find out how many distinctly different solutions there are (discounting reflections and rotations) and what the shortest solution is. Finally to discover if it is possible to get the Bug to end up in the middle or not.

The program will be judged on the following criteria: Does it run correctly (bug free)? Does it find the solutions? How fast does it find a solution? Does it find all solutions and how quickly? Concise programming. Good use of memory space. Imaginative algorithms. Is it self contained? Presentation.



Write the program on any sort of computer, or just in plain Basic and send it as a listing or a cassette to us before June 16. We will include a way of solving the puzzle next issue — just to prove that it is possible.

Send it in to Computer & Video Games, Durrant House, 8, Herbal Hill, London EC1R 5JB. The judges' decision is final and no correspondence can be entered into.

Make sure you include a name and address and the time the program takes to find one solution. Also be sure to let us know what machine it runs on.

The 15 places in our special free Starweb game were very swiftly filled after the May issue found its way into the newsagents.

Our 15 computer moderated gamesters are: David Johnson of Stoke, Paul Kershaw of Littleborough, Steven Draper of Sudbrooke, Marcus Rowland of Westbourne Park, Paul Hardy of St Annes, Anthony Shepherd of Barnsley, Keven Stubbs of Stockport, D.P.Goodman of Stevenage, Jenny Parsons of Stirlingshire, I.C.Spicer of West Norwood, Richard Moore of Wolverhampton, Stephen Loughran of London NW6, Mark Woolrich of Wheatley, Angie Bradley of Birmingham and Bernard Andrews of Manchester.

For the many people who entered but were not lucky, we are looking into the possibilities of running a much larger computer moderated game in the Autumn.

NEXT MONTH

Pacman gave arcade managers plenty of food for thought. In America it was the first video game which proved attractive to women and brought a family touch to the video industry.

In such a male-oriented world as the video industry we wondered if British arcade owners will follow the American business thinking which has since spawned *Ms* Pacman! Are women worth exploiting? We find out in July.

Imhotep the pyramid builder is our featured game next issue. Upon the desert of the east, the first pyramid was raised and the strain on the entire country was great indeed, can you guide your workforce of 1000s to success in the desert?

Casino Royale, Solitaire and Missile Command also feature — as our games listings.

The Prestel page features a long look at the recent competition to produce a Sinclair downloader. Find out about Telesoftware — it could change the face of personal computing.

The Spectrum will always be the Sinclair '82 to owners of that company's earlier models. It's potential is obvious but is it going to take over from the ZX81 and, if so, how quickly? Our July issue will include a 16 page supplement for Sinclair owners.

From those who still haven't exhausted the possibilities of their ZX80, to those who have a yearning for a Spectrum. Something for every Sinclair user and everyone who has been keeping more than one eye on this innovative company.

Keep an eye out for our July issue at the newsagent or order your copy now.

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Asteroids	ROM	16k	£27.95
Super Breakout	ROM	16k	£27.95
Pilot	ROM	16k	£49.95
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Anthill	CAS	8k	£10.99
Adventures by Scott Adams 1-12	CAS	24k	£15.99
Angle Worms	CAS	8k	£11.99
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Moving maze	CAS	16k	£9.75
Alpha Fighter	CAS	24k	£11.75
Murder at Awesome Hall	CAS	16k	£12.49
World War III	DISK	40k	£19.49
Beneath the Pyramids	DISK	40k	£19.49
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Tanktics	CAS	24k	£16.75
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Nukewar	CAS	16k	£11.50
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Memory Master Map			£4.95

ATARI

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CASS. DISK 32k

Datestones of Ryn
20 mins of fighting and chasing to retrieve the gems. **£13.95**
CASS. DISK

VIC-20

Bombs Away
Fly your bomber across the landscape and avoid the anti-aircraft fire. Release your bombs and try to destroy the enemies gun positions. £7.95

Home Finance
Calculate payments, interest rates, remaining balances, future balances, annuities and investments. Calculates any unknown given the other variables of the classic interest formulas. Screen prompts step you through each calculation after selecting your purpose from a master menu. £9.95

Reversal
The VIC acts as the board and judge in a two player strategy game. Flank your opponents pieces and see them convert to your colour. Excellent game of strategy and skill. VIC acts as your opponent. 8k expansion required. £10.95

Target Moon
Another hand / eye coordination game involving a manoeuvrable cannon which you use to shoot down various targets. Excellent use of colour and sound. £7.95

Capture
Draw the robots into the landmines and electrified fences while avoiding their sole purpose which is to capture you. Who will win? £7.95

Math Drill
Generates simple addition and subtracton problems for the young user. Uses giant numbers on the screen and rewards correct answers with a colourful display. £7.95

Biorhythm
8k expansion required. Enter your name and birthdate and the day you wish your chart to begin. The VIC will plot three weeks of biorhythms for you on the screen and then pause until you tell it to proceed or start a new chart. Your physical, intellectual and emotional cycles are plotted in different colours which really create an interesting and informative display. £9.95

Household Inventory
8k expansion required. This program will create and manage a household inventory for insurance purposes. Tracks purchase date, cost, description and location. Will total values and print to screen or printer. £14.95

Data Manager
8k expansion required. Allows you to create and manage your own data base. You can define the number of items in a record and add, change, display, delete, search, sort, print, etc. Your data can be stored on cassette when not in use. £17.95

Stock Portfolio Manager
8k expansion required. Tracks last 6 values of each stock and plots trend curves on screen. Provides complete analysis of your portfolio including number owned, purchase date, cost, value, appreciation, yield, etc. £17.95

Moon Lander
This game allows the 'Astronaut' to take over the controls of a Lunar Excursion Module as it is making its descent to the moon. The program provides information via screen displays depicting amount of propulsion, fuel remaining, height and descent speed. In addition the LEM is displayed as it descends to the surface. If the astronaut is not careful, the module can be damaged or even totally destroyed upon impact. £7.95

Wrap
This is a two player game requiring manual skill and dexterity as you attempt to trap your opponent and force him to 'Crash'. The VIC will act as your opponent if you desire. £7.95

Bricks
This game requires skill as you attempt to knock out the various coloured bricks without missing the returning ball. The deeper you succeed in breaking into the wall the higher the value of your score until you break through and truly increase your score. See who can get the highest score. Joystick version. £7.95

Blackjack
Las Vegas style blackjack with the VIC serving as dealer. Two players can play against the house (VIC) utilizing such strategy as 'Doubling Down' and controlling your bets. Each card is displayed on the screen in full colour. The VIC provides an easy way to develop your 'SYSTEM' before actually going to the tables. £7.95

Tennis
The standard game of Paddle tennis with the option of the VIC playing one or both sides of the net. Excellent use of the colour and sound capabilities of the VIC. £7.95

Slots
Try your hand at this 'One Armed Bandit'. See the wheels spin and the handle pull utilizing the VIC's colour and sound capabilities. You can really get arm weary pumping in your money. £7.95

Alien Raiders
The Aliens are invading the Earth and it is up to you to destroy them before they land. The tension increases as you try to accumulate a high score. Joystick version. £7.95

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WHO'S GOING TO WIN THE WORLD CUP?

In conjunction with the Silica Shop, we are hoping to add a little more spice to your World Cup viewing this summer.

There's a chance to win an Atari 2600 T.V. Games Centre complete with the soccer cartridge, or a £100 to spend at the Silica Shop, one of the leading stockists of T.V. and electronic games.

All you have to do is pick out the World Cup champions, runners-up and the beaten semi-finalist which wins the third place play-off.

If you are spoilt for choice, there will be no shortage of soccer pundits eager to give you their views on the matter.

And you only have to enter to be sure of winning something! For on top of that first prize and two consolation prizes of Atari soccer cartridges or £30 vouchers, there is a £3 voucher for everyone who enters. This can be spent at the Silica Shop 1-4 The Mews, Hatherly Road, Sidcup, Kent or by mail order.

We're not eligible to enter but if you want our advice it's: Scotland, England and Northern Ireland (but not necessarily in that order). But you may want to choose another combination.

And if, in the unlikely case, that our three make early exits from the competition, then you'll



still have some interest in following the World Cup through to its well-televised end.

You could even key-in our own World Cup Manager game and check to see if your prediction runs true to form.

We have included three World Cup questions which will be used as a tie-break if the result of the competition is so predictable that more than one reader guesses correctly. And we need to know whether you want an Atari system and cartridges or would prefer a voucher, so please fill in all the entry form below and send it off to the Silica Shop. To receive a £3 voucher, include a stamped addressed envelope with your entry.

COMPETITION RULES

1) No employees of Computer & Video Games, Silica Shop, or their relatives may enter the competition.
2) All entries must be on the original coupon, not a copy thereof. Entrants must complete the entire entry form to be eligible.
3) All entries must be postmarked no later than June 12th 1982. Any entry which is incomplete, illegible or late will be disregarded by the judges.
4) The judge's decision is final and no correspondence will be entered into. In the event of a tie the first correct entry drawn will be the winner.
5) Only one prize per entry will be awarded and no cash alternative will be offered.
6) Vouchers are redeemable either by visiting, the Silica Shop, 1-4 The Mews, Hatherley Road, Sidcup, Kent or by mail order. Vouchers are valid up to 30th October 1982.
7) Winners will be notified by post. A list of winners will be printed in the September issue of Computer & Video Games.

WORLD CUP COMPETITION

Using your skill and judgement write down who you think will finish

WINNERS ....

RUNNERS-UP ....

THIRD PLACE ....

in this year's World Cup competition?

1) Which country currently holds the World Cup?

....

2) Which is the only country to have won the World Cup three times?

....

3) Who is the only player to have scored three times in a World Cup Final?

....

Do you already own a T.V. game? ....
If so which system do you own?

....

If you win would you rather have the Atari TV Games Centre and cartridges or the voucher?

Game ☐ Voucher ☐ (please tick)

Name: ....

Address: ....

....

Post Code: ....

Send your entry, enclosing an S.A.E. to:
World Cup Competition,
Silica Shop Ltd., 1-4 The Mews,
Hatherley Road, Sidcup, Kent
DA14 4DX.

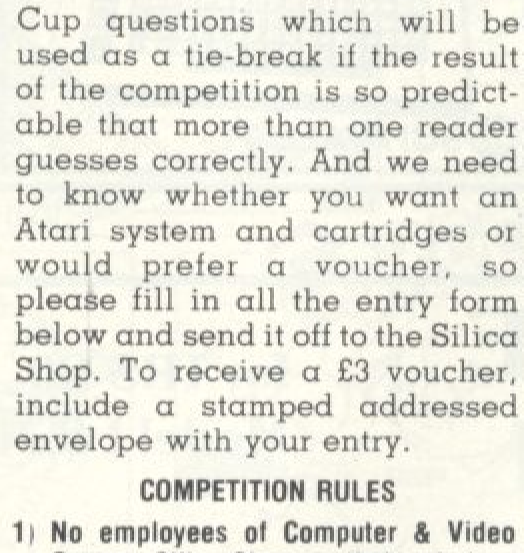
Closing date for entry is Friday June 12 1982.

BRAINWARE ANSWERS

The answer to our May Mind Routines problem is Question one, 5011; Question two, there is no solution to this one; Question three, 4,630,907,663.

The correct solution to last month's Nevera Crossword is printed right and the winners' names will be published in next month's issue.

For more puzzles to tax your brain turn to page 17 for this month's Mind Routine and Nevera Crossword.



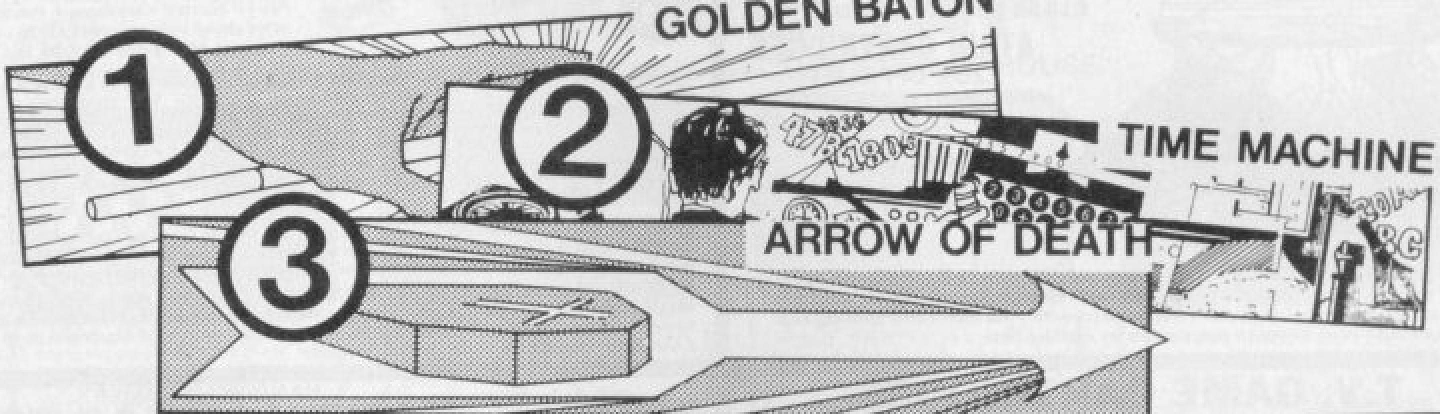

MAL FUNCTION
T. HITCH
SNAG JNR
SCREAMING FOUL UP
THE BUGS
WOW!
THIS FOOTBALL CARTRIDGE IS SOMETHING ELSE!
INSIDE THE MICRO...
GET SNAG! HE'S ON A HAT-TRICK!
GRAH!
ULP!
YEEK!!!
THAT TACKLE WAS DIABOLICAL. MY PLAYER COULD HAVE BEEN OUT FOR THE REST OF THE SEASON.
SCREECH!
HE NEVER TOUCHED HIM REF! ARE YOU BLIND?
REF
SNARL!
TROMP!
UPROAR!
I'M NOT A STREAKER
SUNDAY SPORT
BANNED STAR SICK AS A PARROT!
WORSE TACKLE I HAVE EVER SEEN.' STORMS ATHLETICO BUGS MANAGER.
BYTE UNITED IN CASH CRISIS
DISGRACEFUL SCENES AS BINARY SNAKES INVADE PITCH.
JUST LIKE THE REAL THING!

INNOVATIVE

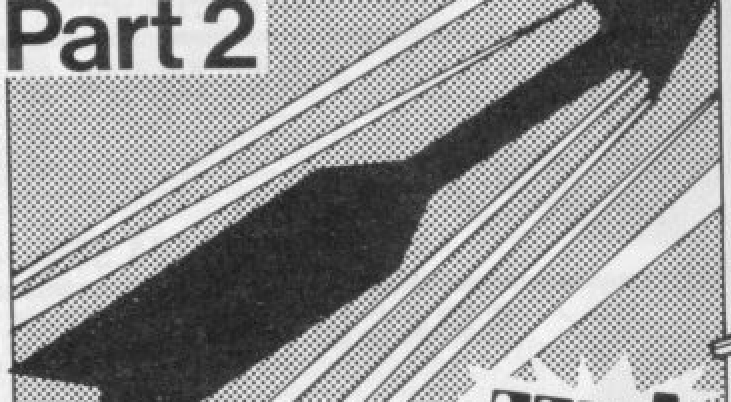
TRS 80-GENIE SOFTWARE

from the professionals

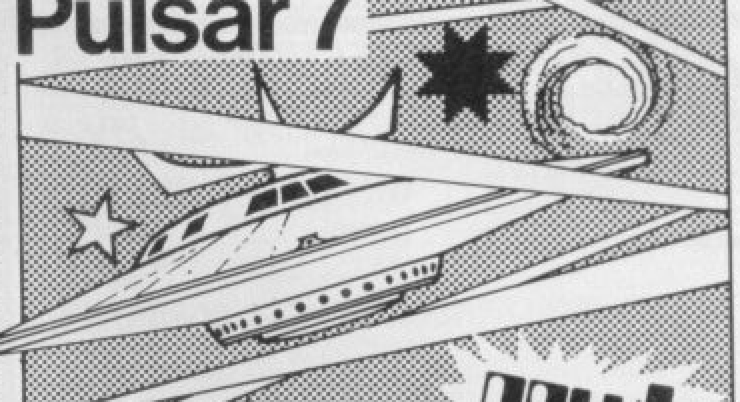
Mysterious Adventure



Arrow of Death Part 2



Escape from Pulsar 7



NOW — The second part of Arrow of Death plus a new Adventure! Escape from Pulsar 7 is the first space Mysterious Adventure. Arrow of Death Part 1, already said to be one of the best 16K Adventures written, is surpassed by the Part 2 edition. Arrow 2 carries on from Arrow 1 but is self-sufficient. In Pulsar 7 you will be delivering Redennium ore to an outer galaxy when you pick up an interesting creature for the intergalactic zoo on your home planet, but what happens when the ore and the animal inadvertently come together?

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Brainware



MIND ROUTINES

3 A	2 B	1 C	1 D	4 E
1 F	Goal	3 H	3 I	3 J
3 K	3 L	2 M	1 N	1 O
4 P	2 Q	2 R	1 Start	3 T
1 U	2 V	2 W	4 X	4 Y

Finding the pathway through this alphabet maze should set your braincells buzzing.

Each square contains a letter and a number. The number shows how many squares can be travelled to reach the next destination. You only "visit" a square when you stop at it and take its numeric value for your next move.

Starting from square S (labelled Start) and moving either horizontally or vertically — not diagonally — by the number of squares indicated, you must visit each square on the diagram once.

No square should be visited more than once and you must finish at the G (labelled Goal) square.

For example your path could start: SXDIF...

What path should you take to achieve your goal?

WIN OUR CHAMPAGNE

The champagne winners for our April issue are hemispheres apart. We have one far from and one close to, home.

The Mind Routines winner is Mr J. Devine from Westville 3630, Natal in South Africa, who correctly pointed out that the number of stolen bags was 1789.

The Nevera Crossword winner was Mr S. F. Rischer of Russell Court, Woburn Place, London WC1 who was first out of the hat with a correct entry.

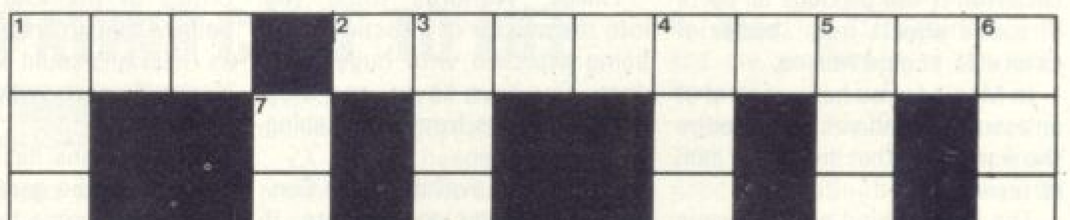
Bottles of champagne are on the way to them both.

Two more bottles of champagne are up for grabs this month for the first two correct answers out of the hat for this Mind Routines puzzle and the crossword below.

Please send your entries to Computer & Video Games, Durrant House, 8 Herbal Hill, London EC1R 5JB to reach us before June 13.

The answers to our May issue's Brainware problems can be found on page 11.

NEVERA CROSSWORD



ACROSS

1. Lettuce function (3)
2. Getting the program working with gravity on the end of the french insect drink (9)
8. Game for a school teacher's brain (10)
11. Ego initialisation of data (2)
12. Ten inside ten buck and one for I terminator (4, 1)
13. Jubilee LF CR? (7)
14. Flags produced by Vic (7)
16. Jump the beginning of the program (5)
18. Toot missing the ducks race (2)
19. Take off the centre forward in naval warfare game (3, 7)
22. Syntactical significances not at charges (9)
23. Annoy the glitch (3)

DOWN

1. Letter sent by modem (13)
3. Gateway to the program? (5)
4. Comic proceed after break (4)
5. Pint without quiet function (3)
6. Play Wizard's Quest for example, going around coming high class King (2, 11)
7. Circular motions mixed into rotas (9)
9. Anger clipping point from the wire (3)
10. Enterprising crystal (9)
13. Our latin GINO system content (3)
15. Polish and erase (3)
17. Go-a singular 7? (1, 4)
20. One piece of hardware (4)
21. Basically assign or rent (3)

GAMES NEWS

MASTERMIND THE DEFEAT OF WARLORDS

VICSOFT 7

Control Technology have just brought out seven good quality games programs on one cassette.

The first of these is Breakout — an extremely colourful version of the game with good sound effects.

Deathrace 2000 is the second game on the cassette. It is based on the film of the same name. During the game you have the unfriendly task of knocking down as many pedestrians as you can.

Sounds is a menu-driven program and is for more serious use than the other games on the cassette. It can produce all sorts of sound effects from sounds of nature to engine noises.

In Moniods you have control of an astronaut and you must dodge the asteriods that hurtle by him at terrific speed.

The Mastermind program runs along the lines of the original board game and is in full colour.



Squash could turn you into a champion or make you feel like a born loser — just like the real thing.

Finally, Warlords turns you into the master of a castle that is being attacked with huge boulders. You have to try and stop these boulders from demolishing your castle.

Vicsoft 7 is available from Control Technology on cassette. It costs £5.95 and runs on the unexpanded Vic-20.

BEWARE THE WANDERING WUMPUS . . .

WUMPUS

The Wumpus is a deadly creature which lives in a cave system and no-one has ever seen a live specimen.

This is because the revolting Wumpus must be successfully tracked down and shot before the hunter actually sets eyes on him.

Suddenly the Wumpus is a very sought after creature. It smells abominable, but that can help the Wumpus hunter.

The object of Sharpsoft's new version of Wumpus is to search for and kill the Wumpus. But your quest is made more difficult by deep pits and Superbats.

At any time you may tumble into a pit and plunge to your death.

If you manage to miss the pits a Superbat may swoop down and pick you up. Once again you could find yourself falling into a pit, or into the open mouth of the Wumpus.

One concession you are given is an "I smell a Wumpus" warning when you are one or two rooms from the beast.

When you encounter the Wumpus you have one chance to shoot it with your crooked arrow, or die in the attempt.

Wumpus comes from Sharpsoft and the cassette costs £5.85.

SURPRISING ATTACKERS

ZX GALAXIANS

Critics of the ZX81 would not believe that an arcade game such as Galaxians could be transferred to the Sinclair — but now it has happened.

ZX Galaxians has all the usual features of the game. The Galaxians move across the screen and you have to hit them with bullets from your base ship at the bottom of the screen.

The Galaxians swoop down in random formations and drop bombs, trying to destroy you. You have four lives which are indicated on a scoreboard at the right of the display.

The board also shows you who has scored the greatest number of hits in a game. The Galaxians also have the knack of surprising the player. One minute you think that you have nearly finished them off and the next more Galaxians arrive.

If you manage to score more points than anyone else has the computer will ask for your name and will display it in the highest score box until someone else beats it. The graphics are very good.

ZX Galaxians runs in 16K and is available on cassette from Artic Computing. It costs £6.95.

WALKING THE STREETS OF SHAME

THE NAUGHTY ONE

It's naughty but nice! Holdco has brought out a game called The Naughty One which allows the players to indulge in all kinds of illicit activities in bars, gambling dens, and houses of ill-repute.

You can earn yourself a slave or get parts of your opponents bodies. But paper money will not buy what you want — you have to use items of your own clothing.

The bank manager is no pinstriped figure of respectability either. He is a pawnbroker. If you get into debt with him you could lose all your clothes.

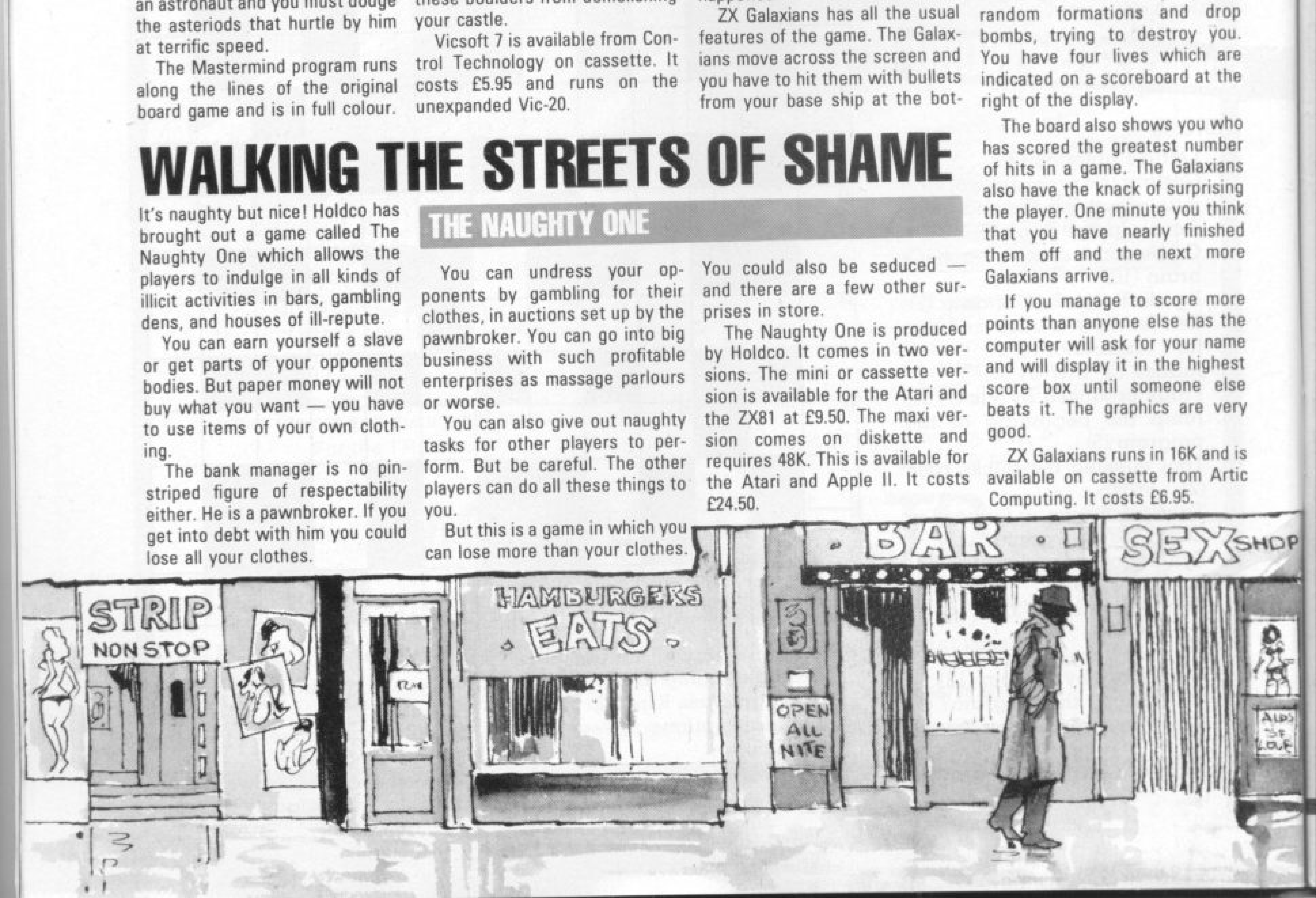
You can undress your opponents by gambling for their clothes, in auctions set up by the pawnbroker. You can go into big business with such profitable enterprises as massage parlours or worse.

You can also give out naughty tasks for other players to perform. But be careful. The other players can do all these things to you.

But this is a game in which you can lose more than your clothes.

You could also be seduced — and there are a few other surprises in store.

The Naughty One is produced by Holdco. It comes in two versions. The mini or cassette version is available for the Atari and the ZX81 at £9.50. The maxi version comes on diskette and requires 48K. This is available for the Atari and Apple II. It costs £24.50.



NOW FIND A FRIENDLY MONSTER . . .



SWORD OF PEACE

The king of a far off country has died and as his heir you must prove your worth by going down into a maze that is crawling with monsters.

Artic Computing's Sword of Peace is a classic adventure game. You must move around the maze, entering sets of move co-ordinates, to find the objects of state. These include the Orb of State, the Robes of State, and the Sceptre — and finally the Sword of Peace.

The game is played on several different levels. When you find an object you are automatically transferred to the next level of the maze.

The monsters are divided into two catagories good and bad. You can actually have a good vampire! To begin the game you are given a series of four spells which you can use against bad monsters.

Your first two encounters with good monsters are very advantageous. Firstly, you are given a direction metre. This tells you the number of moves you are away from an object. Nothing is ever that easy though.

The direction metre only gives you one number to use. For a co-ordinate fix you need two, so you do not know whether you are moving in the right direction.

This is•remedied in your second encounter with a good monster. It will give you a direction metre which shows two numbers. This shows you the number of moves you need to make in each direction before coming across the object. Combined with the first metre it is invaluable.

Good monsters can also teach you spells. They are not guaranteed to work and you can lose a lot of points during battle. When you have been through all the levels of the maze, and have all the Objects of State you can exit and are proclaimed as the new king.

Sword of Peace runs on the ZX81 16K, and is available from Artic Computing. The cassette costs £6.95.

HOW THE KINGS AND PAWNS COME TO LIFE

ZX CHESS

Many people have complained about the graphics capability of the ZX81. Now the seemingly impossible has happened. You can play high resolution chess on a Sinclair.

ZX Chess needs a few pieces of hardware to produce the graphics but the effect is really startling. The board display shows in clear detail actual chess pieces as they look on a real board and not just capital letter representation.

The hi-res graphics version need three pieces of hardware. These are the Quicksilva motherboard, connector, and character generator. The price of these items is not too high for the effects that you can produce.

It is also possible to play ZX Chess 2 without the enhanced graphics. There are seven levels of play. Four of these can be used within competition time limits. You get the option to play black or white using all the legal moves including en passant.

ZX Chess needs 16K and is produced by Artic Computing and is available at £12.99.

EVERY ONE A WINNER!

OTHELLO, CHEQUERS AND CASINO

Kuma Computers are really confident about their new versions of the three oldies for the Sharp MZ-80K. They want to know who the first person to beat their Othello or Draughts is.

Othello boasts good quality colour graphics representation of the eight playing board and 64 double sided playing counters.

The game is between you and the computer. As well as the good graphocs the game also has a quick response time and does not keep the player waiting too long when making a move.

The Sharp version of Chequers, or Draughts, also has a good response time. The colour graphics aré good, showing the traditional checkered board and pieces.

Finally, Casino is a new version of a game of Craps. Craps is essentially an American game which is played in the glittering casinos of Las Vegas.

If you fancy yourself as a gambler and cannot afford the airfare to L.A. then this game is for you.

All three games are available on cassette from Kuma Computers. Othello and Chequers cost £10.50 each. Casino is £5.50.



Illustrations: Jon Davis

THE EMPIRE STRIKES BACK

THE FALL OF THE ROMAN EMPIRE

Nero fiddled while Rome burned — but now there is a chance for you to change that city's history.

The Fall of the Roman Empire transports you back to Europe during the dangerous days of 401 AD. It allows you to play at being a Roman emperor for 30 years, or turns.

You have control of the vast legions of Rome and the cities that you have gained by conquest. The people of those cities must pay taxes to you.

The only problem that you have is the little matter of invading Huns, who launch attack forces at you from Germany. They attack your troops and cities, murder the people of your cities and burn the buildings.

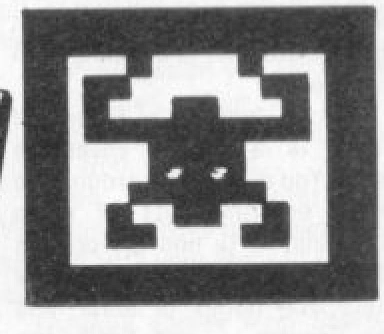
From those cities that escape the Huns you may raise taxes to pay for damage done by the attackers. You can also replenish your battle weary troops, building them up for another confrontation with the enemy.

The game gives you 30 years in which to either rise or fall. You could find yourself reliving rather than changing history.

The Fall of the Roman Empire is supplied by Program Power and runs on the Acorn Atom. The cassette is available for £6.95.

MAZOGS





A MAZE ADVENTURE GAME FOR sinclair ZX81

MAZOGS is a brand new game for the 16K ZX81, unlike any other game you've seen on the ZX81. This is without doubt the best game available for this computer, and if you don't believe us, ask somebody who has seen it, or go down to your local computer shop and ask for a demonstration.

MAZOGS is a maze adventure game with very fast-moving animated graphics. A large proportion of the program is written in machine code to achieve the most amazing graphics you have ever seen on the ZX81.

You will be confronted by a large and complex Maze, which contains somewhere within it a glittering and fabulous Treasure. You not only have the problem of finding the treasure and bringing it out of the maze, you must also face the guardians of the maze in the form of a force of fearful Mazogs. Even if you survive their attacks you could still starve to death if you get hopelessly lost. Fortunately, there are various ways in which you can get help on this dangerous mission.

There are three levels of difficulty, and the game comes complete with comprehensive instructions. The cassette on which the game is supplied is of the highest quality, and loading is guaranteed.

Mazogs is available from Bug-Byte and most good computer shops at £10.00 inclusive.

BUG-BYTE SOFTWARE

100 The Albany, Old Hall Street, Liverpool L3 9EP

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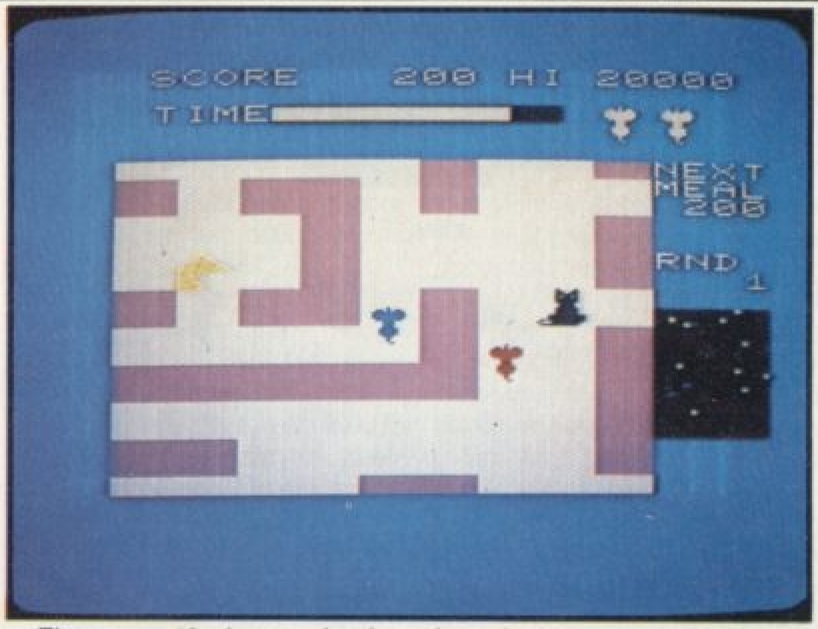
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GAMES NEWS

DON'T GET RATTY IN THIS MAZE

RAT RACE



When it comes to sniffing out a ripe gorgonzola, there's a new breed of Commodore mouse which is positively radar equipped.

Mind you, he has to be to survive in the dangerous mazes of Rat Race. One of the most compulsive and well conceived computer games around, Rat Race owes a great deal to the arcade game Rally X. Only the theme has been changed. Instead of racing cars the combatants in Rat Race are a lone mouse and deadly rats and cats.

The mouse's aim is to survive long enough to consume every cheese in the maze. And he sets off at a cracking pace with three rats in close pursuit. To throw the rats off his trail he can lay a false scent which confuses them and gains him time. But use it sparingly as it takes up valuable time.

There are 10 cheeses in the maze, the first is worth 100 points, the second 200 and so on. But there is one super cheese which is worth twice the normal value and it is advisable to eat this one first as it doubles the score for all the remaining cheeses.

When all 10 cheeses have been eaten the mouse is given a bonus score for remaining time.

But you couldn't have a mouse game without a sprinkling of cats.

The black cats are sprinkled through the maze, and although stationary, they must be avoided or they will cost you one of your three lives.

An ordinary mouse could not be expected to live for long in this environment but the Mousus Commodorous has evolved a sophisticated radar system which displays the whereabouts of cheeses and rats.

The game comes in cartridge form for the VIC-20 and is produced by Commodore. It is available from its dealer network at £17.35 plus VAT.

JELLYMEN ARE A REAL NIGHTMARE

JELLY MONSTERS

Children's parties will become a much more sinister affair after playing the game Jelly Monsters.

The VIC-20 version of Packman goes under this name and features the monsters on its cover — and a pretty nightmarish bunch they are too.

With a maze full of dots, four monsters and four large energising dots, the game follows the Packman format.

The small dots are worth 10 points each, the large dots are 50 points each and whenever one of these is eaten, the chasing Jelly Monsters turn blue and you have a brief respite from their constant pursuit.

This is your opportunity to chase and eat them.

This is a Commodore cartridge for the VIC-20 and joins a growing library of games in this form, presently standing at eight. Also new out are Road Race and Star Battle.

Road Race gives you a set time to travel as far as possible up a winding road, marked only by posts on either side. It is similar to the night driver arcade game.

Star Battle is the equivalent of Galaxians with a hovering group of bat-like space creatures flying in formation at the top of the screen and a lone laser base firing from the bottom.

The Commodore plug-in ROM cartridges cost £17.35 plus VAT.

ESCAPE FROM A DOOMED PLANET

TIME ZONE

Watch out for this mammoth new game for the Apple II. Called Time Zone it lives on six diskettes and allows the player to travel in time over several million years.

The Earth is threatened with a war that it cannot survive. As a citizen of the planet you await your doom outside your house. The year is 1981 AD.

Near the house is a meadow which you go to investigate. There is a strange round object in the middle of the meadow. You walk up to it and look round it cautiously.

There is a door in the side of the object. No-one seems to be watching so you gently push the door open. Suddenly reality becomes blurred and you find that you are in time capsule. You could be transported anywhere.

The makers say that the game could take anything up to a year to play as both sides of the diskettes are used in the game, so you would need a lot of time on your hands in order to play it properly.

Time Zone is available from SBD software and costs £49.95.

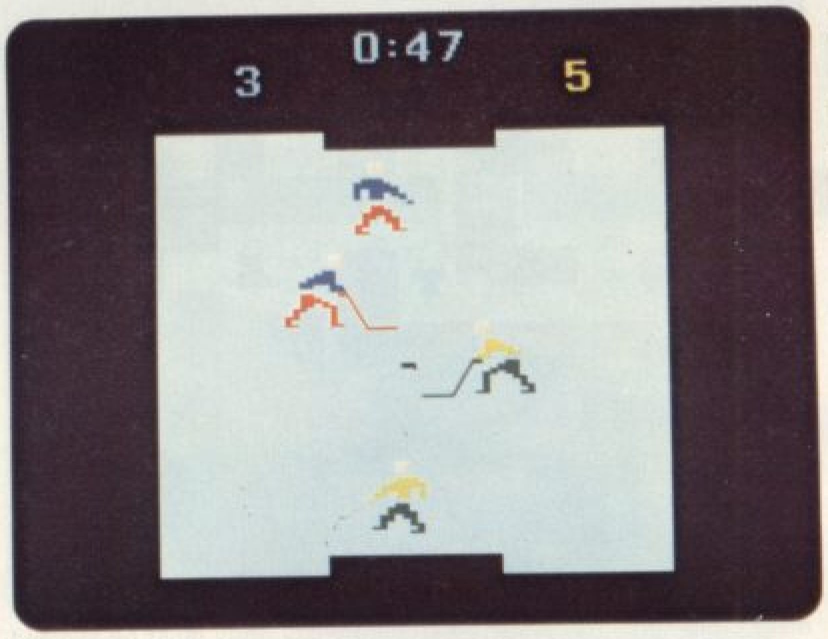


BECOME A KING OF THE ICE

ICE HOCKEY

Experience the excitement and rough and tumble of ice hockey and without collecting the bruises.

Ice Hockey sticks to the traditional idea and comprises of two teams playing with a puck on the ice rink. It's quite possible for the players to finish the game in a bloody fight — which often happens in real life games! It's even more likely with the absence of a referee and without any penalties given to the teams.



Both teams have a goalie providing defence and a forward player to perform the attacking role. The puck can be passed from player to player and each one can shoot from various angles.

The players have a number of tricks up their shoulder-padded sleeves to outwit and out manoeuvre their opponents. They can knock each other down in an unsubtle attempt to take possession of the puck, they can tackle in a variety of ways by body checking, and tripping, and they can also use their stick handling technique to win the ball.

There are also game variations allowing you to speed up the movement of the puck for an extra test or slow it down.

Ice Hockey is produced by Activision for use with the Atari Video Computer System and will be on sale from stockists in June. It costs £26.95, which is more expensive than others because of the extra memory used in writing the game and the greater sophistication achieved.

ATTACK OF THE ALIEN MARAUDERS

GALAXIS

An advancing troop of alien marauders armed with deadly laser weapons are attacking your space fighter. You must destroy the aliens before they get your ship.

In Galaxis you must fight off wave after wave of invading creatures.

This game is a version of the arcade game Galactica. Your ship is given three chances to build up the highest score possible. A series of invaders move across the top of the screen and suddenly peel off in formation swooping down towards you.

Mother ships also join up the invading ranks and these perform a similar swooping action in an effort to out-manoeuvre your space fighter.

Bonus ships are given when you reach a certain number of points and the game gets more difficult as it progresses. The more aliens you blast out of the sky and the more waves you complete the faster the subsequent attack will be.

This is the latest game out for the Interton VC4000 television games centre. It's a 4K ROM cartridge and can be found at Interton stockists for £19.95 from June.

POWER IS THE NAME OF THIS GAME . . .

CONQUEST OF THE WORLD

A world war is being waged with one country trying to conquer the earth.

Two armies battle it out both on the video screen and on a board in this second game in the Master Strategy series for the Philips G7000 games centre.

In Conquest of the World a knowledge of strategic playing is vital. The object of the game is for the two opponents to capture as much enemy territory as possible, using armies made up of tanks, battleships and submarines not to mention troops.

This is the follow up cartridge to Quest for the Rings in which you use a game board to position your armies and work out logistics, while you watch land and sea battles take place on the screen.

The theme of this war game is a confrontation between the world's super powers in a bid to achieve world dominance. Representing the real life relationships of countries during the early 1980s is the board, mapping out the lie of the land and the deployment of forces. Using the game board you can keep track of the whereabouts of all your troops.

When one of the players has conquered the other and achieved the position of world leader the game is over.

Conquest of the World is scheduled for a June release by Philips in the UK.
The price will be £30.00 approximately.

Illustrations Jon Davis





ARCADE ACTION FOR ADVENTURERS AND SPACE ACES

DEFENDER, YARS REVENGE, EUTOPIA, SPACE WALK

Atari is sticking to the winning idea of producing versions of popular arcade games.

Defender is scheduled for release during the summer months and is a rendering of the arcade favourite. Planning to attract fans of the original game Atari is bringing out a similar version which will sell for £29.95. One of the more expensive games but it should be one of the more sophisticated.

Yar's Revenge should coincide with Defender's release date if things go according to plan. This game is for gamers with a taste for Adventure, but further details are still under wraps.

It promises to be a test for experienced Adventurers though and also falls into the more expensive price bracket.

A game shrouded in mystery is due out from Ace for the Intellivision television games centre. Called Eutopia it tells of the story of two islands positioned in the middle of an ocean. The object of the game is to take command of the two islands, thwarting the opponents positions.

You have at your disposal numbers of men who can be deployed at various tasks. Your men can either build tactical plants or build shipping fleets.

For each conquest you make points are up for grabs. Depending on the condition of the frame, or the playing area, the score differs. To further your cause you, as the ruler, can plant troops on the opposition territory. Ace expects to sell this cartridge for £24.95.

Likewise Space Walk, the other forthcoming addition to the Intellivision software series. With four levels of skill to test your space adroitness you can blast various meanies from the skies.

There are a number of alien ships and beings for you to fight — including the deadly space ameoba, and the rainbow bubbles which are filled with a lethal astrogas.

Both these games should be in the shops by the end of July, both retailing for £24.95. G7000 owners should keep their eyes peeled for a new addition to the games range. Already out in America, Monkeyshines is a game set to be a barrel of fun.



WHEN THE WEST WAS WILD!

STAMPEDE

You'll feel right at home on the range in front of your video screen as you attempt to lassoo a stampeding herd of cattle.

That's the idea in a newly released Activision game for the Atari video computer system. Out in the Wild West the number of cattle you owned represented your wealth. In this game you have to keep that number high.

You control a cowboy riding the range equipped with a lassoo. He can only ride on the left hand side of the screen and at the press of a button he unleashes his lassoo to capture a steer.

This requires a good deal of hand and eye co-ordination to judge the distance to successfully rope a steer correctly. The screen is filled with multicoloured cows stampeding the range and for each one you lassoo you score a varying number of points.

Don't let any of them dash past your mounted cowboy and escape his rope, it means lost points. Your cowpoke can stop the galloping cattle either by roping them or by riding up close to a cow and nudging her back.

Mavericks in the herd make things more difficult. They don't move at all so are bound to wander off to the left hand side of the screen eventually. These yearlings must be lassooed or you miss out on points.

The magic score to reach is 1,000. Then you automatically receive a bonus horseman. Go for the black mavericks to quickly build up your points as they are worth more than others.

The cows move at different speeds and there are interesting features written into the game. When your cowhand's pony runs into a stray steer he'll give an almighty buck, and if he stumbles on a rock he'll trip up.

Various skill levels are available and on the higher levels the cows move so quickly it really does become a stampede. The Stampede is available from Activision stockists for £19.95.

FAMILY FAVOURITES

HOME ARCADE

Keep your eyes open for a new home games centre dedicated to arcade games.

Called the Hanimex Home Arcade Centre it will be on sale at the end of June.

Swindon based Hanimex is launching its new system with a total of 17 games cartridges, six of which are versions of money-spinning arcade favourites.

The Home Arcade incorporates the handsets used by the Mattel Intellvision centre. These differ from conventional hand controllers because they consist of a circular disc with which you make your manoeuvres. Others use a joystick device.

Retailing at around £89 Home Arcade follows in the footsteps of Hanimex's other video games centre, the Interton VC4000. According to Hanimex the new centre is based on a more advanced system than the Interton.

Software for Home Arcade springs initially from a Hanimex team who then pass it on to an American sub-contractor which designs and writes each program. The manufacturing process is taking place at the firm's Swindon factory.

Scheduled for launch in June are versions of Phoenix, Defender, Crazy Climber, Pacman, Galactica and Beserk.

Plans are afoot to continue bringing out new games cartridges for the new games centre which will be of an equally standard and meet public demand. Future releases include Centipede, Jungler and Galaga.

At the same time Hanimex will carry on marketing the Interton VC4000.

CHESS



There is more to chess problems than: What Happens Next? It is also possible to ask: What Has Happened?

I left you with two "retrograde analysis" problems last issue with an invitation to look back into the history of the position.

In figure one, the problem is which side made the last move? As with many retrograde analysis problems, the key to solving it is to ask what was the last move. If you try this you will find that white has *no* legal last move — e.g. Pawn from b4 to b5 is not a possibility — why? But Black has several — e.g. Kd4-c5. So Black moved last.

It might seem that programming a reverse move generator for Chess is straightforward, but in fact it is extremely awkward.

Suppose that White has a Bishop on c8 say. It could have reached there by an ordinary move or by a capture. Alternatively it could have moved to c8 as a promoted Pawn from c7 or as a capture with promotion from b7 or d7.

A Black Pawn on g6 might — in general — have reached there from f7, g7 or h7 but the one on g6 in figure one has obviously come from f7. How can this obviousness be programmed?

As part of an artificial intelligence (A.I.) project, a researcher in Britol, Brian Alden, has recently written a program which reasons out the solutions to quite a number of retrograde analysis problems.

Among the routines used by the program are the following:

PCMOV: generates possible reverse moves for a specified side

LEGCHK: checks legality of reverse moves

ISKCHK: tests whether a King is in check

KCHECK: identifies moves which could have placed a King in check

WHPCAP: determines which men could have been captured on a specified square

CPGTOB: tests whether any pieces are constrained by the Pawn structure

The initial version of the program was written in RT-11 Macro for PDP-11 computer and occupied approximately 5K words of memory. A much improved and extended version in POP-2 for a DEC-20 computer is currently being developed. Neither program is commercially available.

As an example of the program in action, here is how it solves last month's second challenge problem.

In figure two, the rightmost Pawn has been carelessly placed between squares g2 and h2. Where should it be? It is White to move and you know there have been no underpromotions.



Fig 1

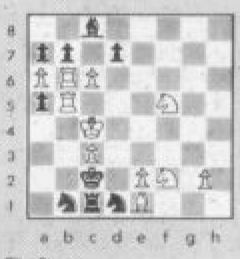


Fig 2

To arrive at a solution the program performs the following chain of reasoning. Since Black moved last, PCMOV generates all possible reverse moves for Black, namely Nb1-a3, Nb1-d2, Nd1-b2, Nd1-e3, Kc2-d2 and Kc2-b2.

LEGCHK now checks the legality of each of these moves.

- The Knight moves all place the White King in check, so these moves are eliminated.
- Kc2-d2 places the Black King in check by White's Bishop on e1 — detected by routine ISKCHK. Routine KCHECK cannot find any legal way in which White could have delivered check, so the check is imaginary and Black's move is eliminated.
- Kc2-b2 also places the Black King in check. This time KCHECK returns the following possibilities as to how such a check could occur. The White Rook could have moved to b5 — possibly with a capture. A White Bishop or Queen could have moved from b3 to c2, to uncover check, and then be captured by the Black King. A Knight move from b4 to c2 is impossible, since two White Knights are still on the board and there have been no underpromotions.

The Queen moves from b3 to c2, Rook moves from b3 or b4 to b5 and non-capturing Rook moves from c5, d5 or e5 are eliminated, since in each case ISKCHK returns the information that the Black King is still in check. This leaves only a Rook capture from c5, d5 or e5, or a Bishop move from b3 to c2 as explanations of the check on the Black King.

Next, WHPCAP is used to determine which Black men have been captured on b5.

- The captured man cannot be the Black Queen's Rook, since that piece is found by CPGTOB to be constrained to move on squares a8 and b8 only.
- It cannot be the King's Bishop, since that piece moves on the wrong colour squares.
- It cannot be a Queen or a Pawn, since either case White would have been in check and there is no previous legal move by Black which would eliminate this check.

This exhausts all possible captures on b5.

This leaves only one possibility: Black's last move was with the King from b2 to c2, capturing a White Bishop which has just moved from b3, discovering check.

The home square of this Bishop is f1. If the carelessly placed White Pawn were on g2 the Bishop would be constrained and unable to leave f1 to be captured.

The White Pawn must therefore be on h2 in figure two!

By Max Bramer

ATARI SOFTWARE

DYNACOMP

FOREST FIRE!: Using excellent graphics and sound effects, this simulation puts you in the middle of a forest fire. Your job is to direct operations to put out the fire while compensating for changes in wind, weather and terrain. Not protecting valuable structures can result in startling penalties. Life-like variables are provided to make FOREST FIRE! very suspenseful and challenging. No two games have the same setting and there are 3 levels of difficulty. **24K (C) £15.99**

NOMINOES JIGSAW: A jigsaw puzzle on your computer! Complete the puzzle by selecting your pieces from a table consisting of 60 different shapes. NOMINOES JIGSAW is a virtuoso programming effort. The graphics are superlative and the puzzle will challenge you with its three levels of difficulty. Scoring is based upon the number of guesses taken and by the difficulty of the board set-up. **24K (C) £15.99**

INTRUDER ALERT: This is a fast paced graphics game which places you in the middle of the "Dreadstar" having just stolen its plans. The droids have been alerted and are directed to destroy you at all costs. You must find and enter your ship to escape with the plans. Five levels of difficulty are provided. INTRUDER ALERT requires a joystick and will run on 16K systems. **16K (C) £15.99**

CHOMPELO: CHOMPELO is really two challenging games in one. One is similar to NIM; you must bite off part of a cookie, but avoid taking the poisoned portion. The other game is the popular board game REVERSI. It fully uses the Atari's graphics capability, and is hard to beat. This package will run on a 16K system. **16K (C) £10.99**

TRIPLE BLOCKARD: TRIPLE BLOCKARD is a two-to-three player graphics and sound action game. It is based on the classic video arcade game which millions have enjoyed. Using the Atari joysticks, the object is to direct your blockading line around the screen without running into your opponent(s). Although the concept is simple, the combined graphics and sound effects lead to "high anxiety". **16K (C) £12.99**

SPACE TILT: Use the game paddles to tilt the plane of the T.V. screen to "roll" a ball into a hole in the screen. Sound simple? Not when the hole gets smaller and smaller! A built-in timer allows you to measure your skills against others in this habit-forming action game. **16K (C) £9.99**

MOVING MAZE: MOVING MAZE employs the games paddles to direct a puck from one side of a maze to the other. However, the maze is dynamically (and randomly) built and is continually being modified. The objective is to cross the maze without touching (or being hit by) a wall. Scoring is by an elapsed time indicator, and three levels of play are provided. **16K (C) £9.99**

ALPHA FIGHTER: Two excellent graphics and action programs in one. ALPHA FIGHTER requires you to destroy the alien starships passing through your sector of the galaxy. ALPHA BASE is in the path of an alien UFO invasion; let five UFO's get by and the game ends. Both games require the joystick and get progressively more difficult the higher you score! ALPHA FIGHTER will run on 16K systems. **24K (C) £11.99**

THE RINGS OF THE EMPIRE: The Empire has developed a new battle station protected by rotating rings of energy. Each time you blast through the rings and destroy the station, the empire develops a new station with more protective rings. The exciting game runs on 16K systems, employs extensive graphics and sound and can be played by one or two players. **16K (C) £15.99**

SANTA CRUZ/TRICKY TUTORIALS

DISPLAY LISTS: Teaches you how to alter the screen format of small and large text on the screen together and high and low res graphics. **16K (C) £13.95**

HORIZONTAL/VERTICAL SCROLLING: Enables graphics or text to be moved up, down or sideways. You could move only the text on the bottom half of the screen or create a map and scroll smoothly over it. **16K (C) £13.95**

PAGE FLIPPING: Learn how to have the computer draw the next page you want to see while you are still looking at the previous page then flip to it instantly. A very useful program. **16K (C) £13.95**

BASICS OF ANIMATION: This program shows you how to animate simple shapes (with sound) using Print & Plot commands and also has a nice Player/Missile graphics game you can play with. **24K (C) £13.95**

PLAYER/MISSILE GRAPHICS: This program shows you how to create a simple shape called a player, then takes you through over 25 examples to create a complete business application and a small game. **32K (C) £19.95**

SOUND: Unless you have spent many hours experimenting with the four voice channels of the Atari, you will learn a lot from this one. With many examples of special sound effects. **16K (C) £13.95**

THE GRAPHICS MACHINE: Type in simple commands like line, boc, circle, polygon, fill and save screen to get hires pictures, you can save and retrieve in seconds. Several demos are included in this great program. **48K (D) £13.50**

PLAYER PIANO: Turns your keyboard into a mini piano. Create your own songs, save on cassette or disc, up to 400 notes in memory. **24K (C) £9.95**

KIDS PROGRAM 1: Three programs on one tape. Maths: test your child's maths skills; Dialogue: talk to your computer; Lost Treasure: search over a small island looking for a treasure. **16K (C) £9.95**

KIDS 2: Three more programs for your children. Spelling Bee, input and test those monthly tests; jumbled up letters give a lot of fun; Touch, follow the computers instructions and stop yourself laughing. **16K (C) £9.95**

ARCADE PLUS

GHOST HUNTER: Rid the mansion on Huckleberry Hill of Ghosts. An exciting, fast action, arcade type game using excellent sound and graphics. **16K (C) £19.95**

SPECTRUM

GALACTIC CHASE: A fast action, arcade type game employing hi-res colour graphics. Wave after wave of attacking aliens must be destroyed in this 'Galaxian' type game. The display is excellent. **16K (C) £16.95**

SCOTT ADAMS ADVENTURES

1.	**ADVENTURE LAND**	24K (C) £16.50
2.	**PIRATES ADVENTURE**	24K (C) £16.50
3.	**MISSION IMPOSSIBLE**	24K (C) £16.50
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6.	**STRANGE ODYSSEY**	24K (C) £16.50
7.	**MYSTERY FUN HOUSE**	24K (C) £16.50
8.	**PYRAMID OF DOOM**	24K (C) £16.50
9.	**GHOST TOWN**	24K (C) £16.50
10.	**SAVAGE ISLAND PART I**	24K (C) £16.50
11.	**SAVAGE ISLAND PART II**	24K (C) £16.50
12.	**GOLDEN VOYAGE**	24K (C) £16.50

NEW NEW NEW

CRYPTS OF TERROR: An excellent graphics based adventure game. Explore 50 crypts, slay the monsters, find the ring and the key to the next level. An excellent, absorbing game employing great colour graphics. **16K (C) £29.50**

MURDER AT AWESOME HALL: Question suspects, search for clues, find the murder weapon, as you wander through the doors of 'Awesome Hall' trying to solve the murder of the Colonel. Good graphics and excellent game features. **16K (C) £14.50**

AUTOMATED SIMULATIONS

Crush, Crumble & Chomp: Breathe fire, terrorise cities, snack on a horrified populace, four metropoli, five objectives, over 100 possible scenarios, hi-res colour graphics. **32K (C) £22.45**

Dragons Eye: An outstanding introduction to fantasy role-playing adventures — combining simplicity with variety and real time battle graphics. Will captivate and entertain for hours. **32K (C) £18.75**

Ricochet: An abstract action strategy game. Challenging, thought provoking and fast moving. Work out the angles, avoid the obstacles. Hi-res graphics. **16K (C) £14.95**

Star Warrior: Walk, jump — even fly — over swamps, forests and mountains with scrolling mad graphics. Excellent graphics. Superb strategy game in which you try to free an occupied planet. **32K (C) £29.95**

Temple of Apshai: Project yourself into the labyrinth. See and touch the treasures, hear and smell the creatures. Discover for yourself the fantasy of Apshai. Excellent, award-winning game. **32K (C) £29.95**

Upper Reaches of Apshai: Continue the adventures of Apshai. Four levels, over 150 rooms, gardens etc. Monsters and evil nobglobins. This game requires Temple of Apshai to play. **32K (C) £14.95**

Rescue at Rigel: Can you rescue the 10 prisoners before your power pack is depleted? Can you get back to your rendezvous point in time? Can you escape the dreaded clutches of the unmerciful High Tollah. **32K (C) £22.45**

Invasion Orion: One-on-one starship combat to full scale Armageddon in this challenging and exciting space tactical warfare simulation. Good graphics and great versatility. **24K (C) £18.75**

Datestones of Ryn: Can you find and retrieve the datestones in the seemingly endless maze of rooms full of horrors. Great adventure role playing game. **32K (C) £14.95**

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GO GO GO

GO TO WORK ON THE ZX81

BY ALAN SCARFF

Go is in essence very simple. It comes as no surprise therefore that the basics of the game are easy to program.

The short ZX81 BASIC program shown allows you to use your T.V. screen as a Go board. The program is no advance on the traditional board. It is merely a starting point for better things to come!

The most obvious extension is to add in the rules of play. A major element, capture, takes place when stones are closely surrounded by the opposing force. Wouldn't it be nice if we could make the program remove captured stones automatically?

At first sight this seems straightforward enough — the program must check that a single stone or a group — adjacent stones of the same colour — has no further liberties — adjacent vacant points. But as with many programming exercises, there are logic traps just waiting for the unwary!

First, we must consider more than one group, each independently. In fact up to four groups can, in theory, be captured by a single move. This extreme case is shown in the first two diagrams.

A second tricky problem is how to get the program to identify all the stones of a group without missing any. Then it's even trickier to get the program to recognise when it can stop looking!

The best solutions are often the simplest. Only if the program proves slow in practice need it be "polished". One simple method of detecting a group relies on copying that group on to an entirely fresh array — call it the "capture" array — the same size as the board array.

The code for detecting a group should be written as a subroutine. Then it can be used for each potentially captured group adjacent to the last stone played.

The subroutine can detect when it should stop and return to the main routine by using a repetitive process of "sweeping" its capture array. At each sweep it will either find another adjacent stone to extend the group, or it will not, in which case it can stop!

Having used the subroutine to detect a captured group, it can also be used to check if the last move has attempted to capture itself. Such a move is illegal. This can be indicated by generating a noise or whatever else you consider appropriate!

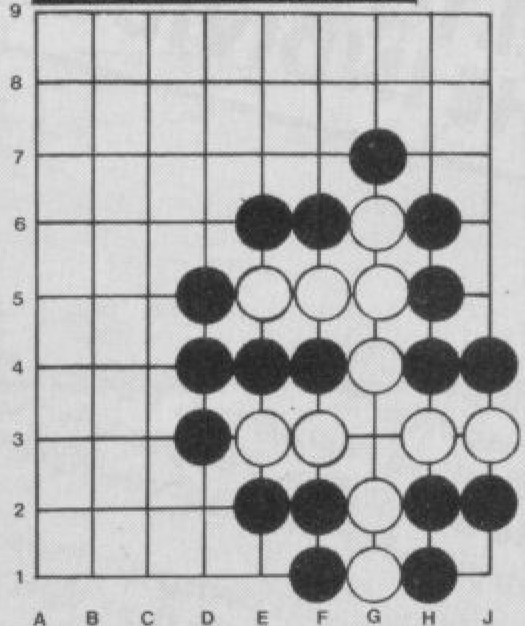


Fig 1

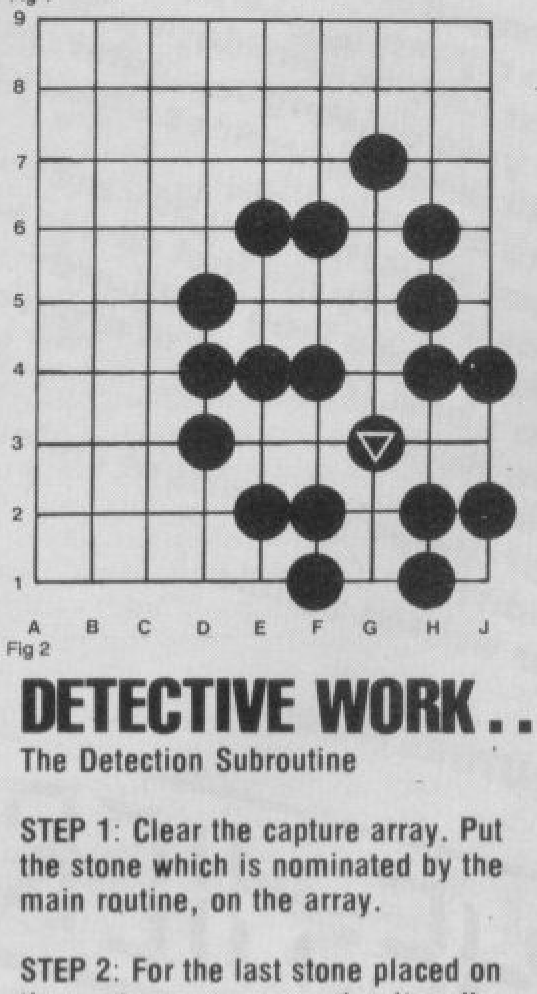


Fig 2

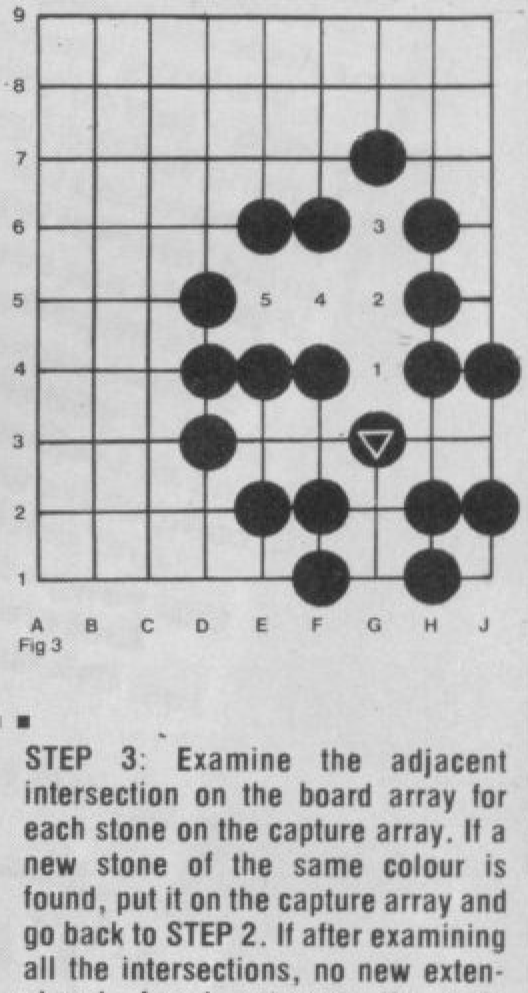


Fig 3

DETECTIVE WORK . . .

The Detection Subroutine

STEP 1: Clear the capture array. Put the stone which is nominated by the main routine, on the array.

STEP 2: For the last stone placed on the capture array, examine its adjacent intersections on the board array in the order North, East, South and West. If any adjacent intersection is found to be vacant, exit from the subroutine with a "not-captured" result. If any adjacent intersection is found to hold the same colour stone, i.e. it extends the group, then put this stone on the capture array and start STEP 2 afresh. If, however, neither a vacant intersection nor an extension to the group is found, proceed to the next step.

STEP 3: Examine the adjacent intersection on the board array for each stone on the capture array. If a new stone of the same colour is found, put it on the capture array and go back to STEP 2. If after examining all the intersections, no new extension is found, return to the main routine with a "captured" result.

Figure 3 shows the order of detection of the stones in one of the captured groups. STEP 1 puts stone 1 on the capture array. STEP 2 places stones 2 and 3. STEP 3 sweeps the capture array to find and place stone 4. STEP 2 then places stone 5. Finally STEP 3 fails to find a fresh extension to the group and so returns with the list of captured stones.

Adventure

DIAMONDS AND CLAWS

Now that we have covered the basics of Adventure programming — pardon the pun! — we are ready to have a look at some of the intricate parts.

When you first started writing your game, no doubt the word SCORE seemed very remote from your problems. Nevertheless, most Adventure games have a SCORE feature, the score usually being based on the number of treasures deposited in a special treasure storage location.

Let us code a score feature awarding say 10 points per treasure deposited in location LT.

First it will be necessary for the treasures to be recognised and not confused with "ordinary" objects. If obvious descriptions like DIAMOND or GOLD BAR are used, the player is probably in little doubt, but the computer won't be terribly impressed.

Therefore, all treasures in the object array should be grouped together in a block, say from 0$(n) to 0$(n+m). The command SCORE can then execute a routine like:

```
SC = 0 : REM SC is score – zero
to start count
FORE I = (n) TO (n+m)
IF P(I) = LT THEN SC = SC+10
NEXT
Q1$ = "You have scored"; SC :
GOTO (start)
```

If the treasure descriptions are less obvious, like AMBER CLAW, then even the player may be in doubt as to its value.

A way round this is to identify each treasure with a special symbol such as an asterisk or a diamond alongside its description, for example *AMBER CLAW*.

Thus, treasures no longer have to be grouped together in the array, although doing this will still help to reduce the scan of the object array. We can now have:

```
SC = 0
FOR I = 0 TO (n) : REM Object
array has (n+1) elements
IF P(I) = LT AND LEFT$(0$(I),1) =
"*" THEN SC = SC+10
NEXT
Q1$ = "You have scored"; SC :
GOTO (start)
```

No doubt you are wondering if you will now have to type "*DIAMOND*" to reference a diamond that's a treasure. You don't, but I will explain the way round this next month.

A couple of points to beware of. The treasure stores will be frequently visited once discovered, and could well become a depository for all sorts of rubbish as well as treasures.

When this location is visited and the objects present are displayed, towards the end of the game the display variables may not have sufficient capacity to contain all the objects, or the amount of string space available for the concatenation of these objects may be insufficient.

This may result in truncation of the object/treasure list, or cause the program to "hang up" whilst the machine searches for free string space, possibly breaking with an Out of String Space error.

If the variables won't hold all the objects, establish more variables, then work on the string space problem — increase it by a hundred or so. This may now lead to an Out of Memory error, in which case revert to the working version of the string space, and restrict the number of objects that can be deposited at the location by limiting them to treasures only.

To do this you will need to modify the DROP routine to detect the asterisk, and if not found reply with a message like "SORRY, ONLY TREASURES MAY BE DROPPED HERE".

Meanwhile, to round off the SCORE routine, don't forget to bring the game to an end if all treasures are home, by following the NEXT line by:

```
IF SC = 100 THEN (clear screen):
        PRINT
"Congratulations, you have
        won" : END
```

Scott Adams' adventures are always full of mystery and excitement, and have set something of a standard on the Micro Adventure scene. So it's about time we had a look at another of his works.

Savage Island, part one, is one of the most devious games that I have played. The object is not to collect treasures, but to obtain the password needed to commence part two. Who could resist buying the sequel after such a struggle?

At the outset, one finds oneself on a deserted beach on a tropical island. A stroll around reveals an impenetrable jungle, a plain, a shark-infested ocean and an extinct volcano.

It all seems like a very routine exploration job. Even after working out how to keep at bay the bear who inhabits the cave at the top of the volcano — a problem that you will spend hours sweating over — things seem to be going quite well... except for the lingering sense of



unease after having examined the stone head back on the beach.

But it's easy to forget about that, trying to survive hurricanes and investigating bangs and bumps in the night.

Is the island all it seems? Where are those vital tools we became certain we needed some two months ago and still haven't found?

There is indeed something very sinister afoot, and it seems our old chortling friend from Pirate's Island is lurking around somewhere. So startling is the finale to this first part, that having been clever enough to get the password, I can't wait to find out what happens in part two.

Savage Island is published by Adventure International and versions are available for TRS-80, Video Genie, Apple, Exidy Sorceror, And Atari computers.

BY KEITH CAMPBELL

ARCADE



TIPS ON DONKEY KONG

DON'T MONKEY AROUND WITH KING KONG!

King Kong certainly grossed plenty of money at the box office and now he's doing it again in the arcades.

The mammoth monkey is the star of Donkey Kong (also to be found under the name of Crazy Donkey) the arcade circuit's current money-spinner.

There are four screens to this game which features an attempted rescue, by a cartoon character known as Jump Man, of a young lady in Kong's clutches.

For the beginner the game offers a rather confusing array of possible tactics.

The first screen shows Kong rolling barrels down a tilted array of girders, up which Jump Man must run to rescue his lady.

Points are scored for jumped over or hammer-squashed barrels, but these are not as significant as the time bonus given for reaching the top of the screen — so give that priority.

The hammer is a double edged weapon, crushing barrels in the hands of a wielder but liable to disappear at the most misfortunate moments and also preventing you from climbing.

Golden rules for this first wall known as: "Stairway to the Stars".

STREET TALK

Although the name of the game is Donkey Kong, human perversity dictates that the hairy gorilla throwing things down from the top of the screen, should be nick-named "The Monkey".

Donkey Kong is a rich playground for people who like coining nick-names. "Conveyor belts" is a pretty common term for the moving stairways which give the hero a lift to the top of the screen or shunt him unexpectedly sideways.

When the Jumpman goes on the rampage with the hammer, I have overheard the phrase: "Give 'em some steel". And the big stairway in the third screen is are: don't wait beneath the edge of a girder — you can't jump a falling barrel — and try to use the right hand side of the screen — Kong drops things straight down on the left. Don't forget that you can always hide halfway up a ladder if in trouble.

The second screen seems more difficult but can be negotiated quickly for a big time bonus.

Little fires and things which can best be described as pies, form Kong's main threats in this screen of conveyor belts. For a fast time, run along the bottom of the screen to the right and go up to the first level.

Leap on the conveyor belt when there's a gap and you'll find yourself travelling along to the fire — fatal — but there is a ladder above you and that is the way to safety. If you miss, it is possible to move along the conveyor belt the wrong way by running jumps.

Up to the next level and some pie jumping needs to be done to get underneath the extending and contracting ladder. Wait until it extends to the top — and Kong is not too close — to make your break for home and a high bonus.

The third screen features lifts running up and down a central structure. Take the lift up to collect as many objects — umbrellas, chickens and the like — as you dare then down and jump to the staircase. Watch the falling missiles until you are sure of their pattern. Make your dash beneath them as they move to their furthest point from you.

The final dash for home is a question of finding the safe spots beneath the bouncing projectiles. These are just above the penultimate ladder and one centimetre away from the final ladder. Strategic waits here will see you safely home.

The fourth wall can have no set strategy as it is very random. Eight cork-like plugs are the key features which must be collected. These have the added bonus of restricting the fires' movement. When all eight have been collected the screen has been conquered and they can be done in any order.

Use the hammer on this wall to squash the four fires on the middle level.

After this the game repeats but becomes faster and harder. Remember: the longer you take the faster the fires get and beginners should watch out for a good time bonus at the top right hand corner of the screen: 4-5,000 is reasonable, but some machines offer only 2,000 and prove very difficult.

TIME TO TALK TURTLE

TURPIN

Turpin is an everyday tale of pond survival with a sprinkling of Russian roulette thrown in as well.

The hero figure is a turtle whose mission is to see six baby terrapins home to the turtle house.

There are eight mystery locations around the screen which make up a maze and the six baby terrapins are hidden away beneath these.

The catch is that two deadly Snapper turtles are also hiding out beneath these locations.

The Snapper's must be avoided which is easy at first as they roam the screen at random. But when they turn blue later they pursue the player.

The player can drop an egg bomb to stun a Snapper turtle but he only has three of these at the beginning of the game although three more are granted each time the player turtle crosses the centre star.

To earn a new screen the player must deliver all six terrapins to the turtle house.

Turpin is a new maze-chase game which definitely should be placed in the "cute" category. Fine graphics on a deep-blue pond background and the Snappers look suitably vicious.

Points are scored for: delivering a terrapin, 150; piggybacking a terrapin, 100; eluding a Snapper turtle, 80; and stunning a Snapper, 50 points. A bonus player turtle is awarded for over 5,000.



ACTION

DIG THESE CRAZY MONSTERS

DIG-DUG

When it seemed that maze games were in danger of turning up one of their own dead ends, a new innovation has emerged.

The do-it-yourself-maze game goes under the name of Dig-Dug and features a kind of super allotment where all the action takes place.

The hero is a gardener, who comes complete with his own spade and a healthy appetite for "greens".

The screen shows a cut-away view of the land and the player controls the gardener as he digs out a maze of tunnels.

His aim is to collect vegetables from within the ground and destroy any monsters that try to thwart him.

The monsters are a motley looking crew which seem to have come straight out of the darker recesses of the games designer's imagination and live beneath the soil.

The only easily described creature is one which resembles a dragon — page 97 in the book of common garden pests.

They can be despatched by the gardener by dropping rocks on them or blasting them with his gun.

Points are scored for any monsters which our hero kills off and any tasty vegetables he consumes in the game.



THE MEAN MACHINES ARE HERE!

ROBOTRON

That ever-popular science fiction theme, the robots have taken over the asylum, has now been recreated story-book fashion in the arcades.

Robots, the story goes, fed up with mankind's inept attempts at running Earth, decide to take matters into their own steely mits and, with a fair degree of death and destruction, set out to do just that in the new game Robotron.

As always in these tales, one man stands between the robots and total human oblivion — in Robotron, that man is you.

Armed with a robot-blaster, you are charged with the protection of your family. The robotic hordes come in all shapes and sizes. The early ones tend to be small and easily despatched, the later models are bigger and more dangerous.

Certain varieties cannot be killed but only stopped for a time, others have the ability to turn your family into mutants.

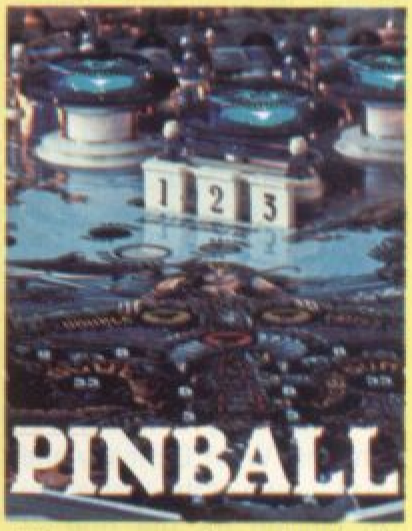
The machine tells you the story and how to play. The story expands to illustrate each new screen and describe the events.

The game is a cross between Berserk and Defender and you are represented on the screen by a human figure which is controlled by an eight-way joystick.

Each screen is progressively more difficult and by the third screen you have to deal with mutated family members.

Like Defender, the game comes from the Williams stable. It is due to be launched here at the end of May and is confidently expected to be a successor to the popular Defender.





Video games have ironically turned out to be a real shot in the arm for the pinball machines which once seemed in danger of losing out to the likes of space invaders.

The pinball designers, forced to become more innovative and imaginative to win back the players are now producing machines which put the accent firmly on the skill factors and give dedicated players a chance to build up high scores without relying heavily on the run of the ball.

One of the new breed of pinball games is Hyperball which could herald the start of a new category of arcade games.

It has the familiar pinball features of backboard, play-area, targets and ball-bearings — but there the similarity ends, for Hyperball is not about keeping balls in play.

Instead the player is given two triggers which take the place of the normal flippers and let him fire the ball-bearings directly into playfield. It is a rapid fire theme that has already made Hyperball very popular in the U.S.

The playfield is dominated by an energy centre which is bombarded by draining energy bolts. The aim of the player is to hit targets and prevent the lightning bolts from striking home.

The balls come out at anything up to 250 a minute and good players will make full use of this speed to protect the energy centre. Bonus points are offered for players who can hit targets which spell out words requested by the machine. One example is "energy" which must be spelt out in sequence by dropping balls through correct holes in the deck.

It is a fast action game which rewards skill—but it is difficult.



RUNS ON A SHARP MZ-80K IN 26K

BY TERRY ALLEN

WORLD CUP

It's halftime in the semi-final against Czechoslovakia and you're 2-0 down.

As the team troop back into the changing rooms you wonder whether you should change your tactics. The 4-2-4 system you elected to play seems to be giving the Czechs a lot of possession in midfield and your sweeper has been caught out twice by their tendency to hit early crosses to their centre forward Nehoda — who scored both the goals.

You seemed to have the easier task too, for in the first semi-final West Germany and Brazil — two of the teams you had fancied for the title — had battled to a 2-2 draw, with Brazil romping through 5-2 in extra time.

Luckily you had the foresight to get your scouts to compile a thorough dossier on Brazil and there ought to be no surprises when you meet them. Perhaps you'd have been better off sending a scout to watch the Czechs.

Well you'd better pull another player back into midfield and also try to close down the Czechs' space in the centre — Panenka has been controlling the midfield.

And what about a substitution? Several of your players have been giving away possession .

It's not as though you haven't had chances, Morley was closest rounding two defenders before he shot wide, if that had gone in . . .

World Cup Manager sets out to give you all the frustrations of sitting on the bench when the national side you manage go a goal down 20 minutes from time in a crucial match.

And hopefully, with some careful attention to tactics and good substitutions in critical games, it should give you all the elation of guiding your country's team through to the championships of the 1982 World Cup Finals.

The game runs on a Sharp MZ-80K in a massive 26K but is packed with REM statements and there is not a PEEK or a POKE in sight so transferring it to another machine should not cause too many problems.

It will let you manage any of the 24 countries involved in the 1982 World Cup but expect to have a more difficult time if you pick El Salvador than if you choose Brazil.

It invites you to enter your team and then publishes the draw for the competition with initially six groups of four. Set out the countries you think will be stumbling blocks to your continuation in the competition and send off your scouts to watch them.

Remember you can get through by finishing second in your group so it may not be necessary to watch all three teams in your group. The first game comes up and a dossier on the opposition is printed out. Pay careful attention because you will have to find good tactical answers to the opposition's ploys.

There are other considerations too, choose your formation carefully and if you need to boost your goal difference to qualify, try to manufacture an open game. *Turn to page 35*

```
4 DIM Q(4),W(4),D9(4),F9(4),A9(4),G2(4,3),D8(4),T9(4),P9(4),R(24)
5 DIM S8(4),N1(2),G(24),M(6,4),T1(3,3),T2(3,3),T3(3,3),T4(3,3),T4$(20)
6 V=0:B4=0
7 DEF FNA(X)=INT(RND(1)*X)+1
10 DIM A$(24):DIM F(24):DIM H1(3,3)
12 DIM A1(3,3):DIM M1(24,21):DIM M2(24)
14 DIM T5(24),T6(24),T7(24),T8(24)
16 DIM S5(24),S6(24),S7(24),Z9$(12)
18 DIM A1$(9),A2$(9),U2(11)
20 DATA BRAZIL,ARGENTINA,W.GERMANY,YUGOSLAVIA
30 DATA HUNGARY,BELGIUM,ITALY,POLAND,FRANCE
40 DATA CZECHOSLOVAKIA,SPAIN,ENGLAND,SCOTLAND,N.IRELAND,PERU
50 DATA AUSTRIA,CHILE,"EL SALVADOR",HONDURAS
60 DATA ALGERIA,N.ZEALAND,CAMEROON,KUWAIT,RUSSIA
62 DATA 1,1,0,1,2,1,1,0,0,0,0,1,1,2,1,0,2,2
64 DATA " HITS THE BALL TOO FAR AHEAD OF ","'S PASS IS MISCONTROLLED BY "
66 DATA " LOSES THE BALL IN A MISUNDERSTANDING WITH "," HITS A LONG BALL TO "
68 DATA " PASSES WIDE TO "
69 DATA" CROSSES TO "," PLAYS A HIGH BALL TO "," COLLECTS A PASS FROM "
70 DATA" PLAYS A ONE-TWO WITH "
72 DATA" IS SENT AWAY BY "," WINS A FREE KICK FROM "," MOVES INSIDE "
74 DATA " SWERVES PAST "," DUMMIES "," RUNS ROUND "," RACES PAST "
76 DATA " SHRUGS OFF A CHALLENGE FROM "
82 DATA" IS TACKLED BY ","'S PASS IS CUT OUT BY "
84 DATA "'S CROSS IS HEADED AWAY BY "
90 DATA 5,15,30,30,5,15,15,30,5,5,30,15,15,5,30,30,15,5
92 DATA 5,30,15,15,5,30,30,15,5
94 DATA "'S CHIP FOR GOAL IS HEADED AWAY BY "," LOSES THE BALL TO "
95 DATA " IS TACKLED BY ","'S VOLLEY IS PUNCHED CLEAR BY "
96 DATA "'S FIERCE DRIVE IS WELL SAVED BY "
97 DATA " BLASTS THE BALL WIDE "," ROUNDS THE 'KEEPER AND MISKICKS"
98 DATA " BEATS TWO DEFENDERS AND SHOOTS WIDE"," STUMBLES AND LOSES THE BALL"
100 DATA "'S CHIP FOR GOAL FINDS THE BACK OF THE NET"," BLASTS THE BALL HOME"
102 DATA " VOLLEYS INTO THE ROOF OF THE NET"," TAPS THE BALL IN FROM 5 YARDS"
104 DATA " HITS A LOW SHOT INTO THE NET","'S SHOT BOUNCES UNDER THE KEEPER"
106 DATA "'S SOFT SHOT IS DROPPED BY THE KEEPER"," LETS FLY WITH A LONG SHOT"
108 DATA " STEPS INSIDE THE FULLBACK,ROUNDS THE KEEPER AND SLOTS HOME"
```

```
188 GOSUB11062
190 GOSUB11070
194 GOSUB11094
196 GOSUB 11110
200 GOSUB 12100
210 GOSUB 5400
220 GOSUB 12300
230 GOSUB 12615
270 PRINT"▣"
280 PRINT"PLEASE CHOOSE YOUR TEAM"
290 PRINT"ENTER A NUMBER FROM THIS LIST"
292 X=1
295 GOSUB 1295
330 GOSUB 1330
332 GOSUB 670
400 PRINT "▣"
410 PRINT "YOU ARE MANAGER OF ":A$(T)
420 PRINT "YOUR AIM IS TO WIN THE 1982 WORLD CUP"
440 GOSUB 9930
480 FOR I=1 TO 6
490 S=0
500 Y=FNA(24)
510 IF G(Y)<>0THEN GOTO 500
515 S=S+1
518 G(Y)=I
520 M(I,S)=Y
530 IF S=4 THEN GOTO560
540 GOTO 500
560 NEXT I
562 PRINT"▣":"THE DRAW IS AS FOLLOWS"
564 PRINT" "
570 FOR I=1 TO 3
575 PRINT " "
580 PRINT "GROUP ";STR$(I);TAB(20);"GROUP ";STR$(I+3)
582 PRINT " "
590 FOR J=1 TO 4
600 PRINT A$(M(I,J));TAB(20);A$(M(I+3,J))
610 NEXT J
620 NEXT I
625 PRINT " "
628 FOR I=1 TO 5000:NEXT I
630 GOSUB 9900
635 GOSUB 6000
652 GOSUB 5000
654 GOSUB 5100
656 GOSUB 9900
658 GOSUB 5200
660 GOSUB 4200
661 GOSUB 3000
662 GOSUB 3200
663 GOSUB 9900
664 IF E2>E1 THEN B2=X2:B3=X1
665 IF E1>E2 THEN B2=X1:B3=X2
666 PRINT"▣":PRINT"CONGRATULATIONS TO ";A$(B2)
667 PRINT"1982 WORLD CUP WINNERS"
668 END
669 PRINT "▣"
670 PRINT "NOW YOU MUST NAME YOUR TEAM "
680 DIM K$(12)
690 PRINT "KEY IN THE PLAYER'S NAMES AS PROMPTED"
700 D$="GOALKEEPER ":I=1
705 GOSUB 14000
710 FOR I=2 TO 5
720 D$="DEFENDER "+STR$(I-1)
730 GOSUB 14000
740 NEXT I
750 FOR I=6 TO 8
760 D$="MIDFIELD PLAYER "+STR$(I-5)
770 GOSUB 14000
780 NEXT I
790 FOR I=9 TO 11
800 D$="STRIKER "+STR$(I-8)
810 GOSUB 14000
820 NEXT I
822 D$="SUBSTITUTE ":I=12
824 GOSUB 14000
826 RETURN
870 END
1295 PRINT" "
1300 FOR I=1 TO 12
1302 IF X=1 THEN GOTO 1310
1304 IF (T-I)*(T-12-I)<>0 THEN GOTO 1310 .
1305 IF T=I+12 THEN GOTO 1308
```

MANAGER

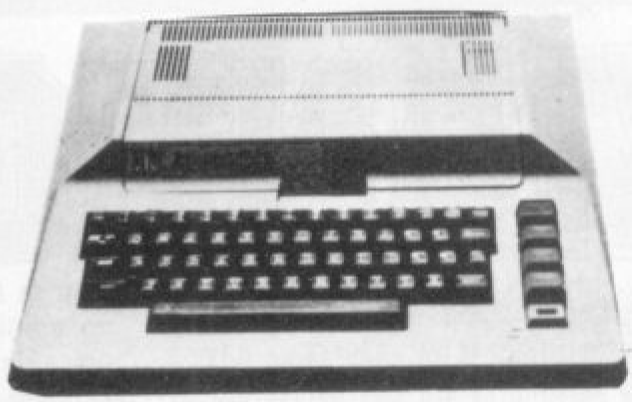


```
1306 PRINT TAB(20);STR$(I+12);".";A$(I+12)
1307 GOTO 1320
1308 PRINT STR$(I);".";A$(I)
1309 GOTO 1320
1310 PRINT STR$(I);". ";A$(I);TAB(20);STR$(I+12);". ";A$(I+12)
1320 NEXT I
1322 PRINT" "
1324 PRINT" "
1325 RETURN
1330 INPUT"WHICH TEAM?";T$
1335 T=VAL(T$)
1340 IF T<1 THEN GOTO1350
1342 IF T>24 THEN GOTO1350
1344 GOTO 1370
1350 PRINT "PLEASE TYPE A NUMBER BETWEEN 1 AND 24"
1360 GOTO1330
1370 RETURN
3000 PRINT "▣"
3010 PRINT "BARCELONA 8th JULY 1982"
3020 PRINT " "
3030 PRINT "WORLD CUP SEMI-FINAL"
3040 PRINT " "
3042 PRINT A$(S8(1));" V. ";A$(S8(3))
3043 X3=1
3044 GOSUB 9930
3045 X1=S8(1):X2=S8(3)
3046 IF X1=T THEN Z=X2:GOSUB 9000:E1=B:E2=C:GOSUB 4475:GOTO 3052
3048 IF X2=T THEN Z=X1:GOSUB 9000:E1=C:E2=B:GOSUB 4475:GOTO 3052
3050 GOSUB 4400
3052 M2(X1)=M2(X1)+1
3053 M1(X1,6)=X2:M1(X1,13)=E1:M1(X1,20)=E2
3054 M2(X2)=M2(X2)+1
3055 M1(X2,6)=X1:M1(X2,13)=E2:M1(X2,20)=E1
3056 IF (X1-T)*(X2-T)<>0 THEN GOSUB 9900
3060 PRINT "▣"
3070 PRINT "SEVILLE 8th JULY 1982"
3080 PRINT " "
3090 PRINT "WORLD CUP SEMI-FINAL"
3100 PRINT " "
3102 E2=0:E1=0
3104 PRINT A$(S8(2));" V. ";A$(S8(4))
3106 GOSUB 9930
3107 X1=S8(2):X2=S8(4)
3108 IF X1=T THEN Z=X2:GOSUB 9000:E1=B:E2=C:GOSUB 4475:GOTO 3112
3109 IF X2=T THEN Z=X1:GOSUB 9000:E1=C:E2=B:GOSUB 4475:GOTO 3112
3111 GOSUB 4400
3112 M2(X1)=M2(X1)+1
3114 M2(X2)=M2(X2)+1
3116 M1(X1,6)=X2:M1(X1,13)=E1:M1(X1,20)=E2
3118 M1(X2,6)=X1:M1(X2,13)=E2:M1(X2,20)=E1
3120 IF (X1-T)*(X2-T)<>0 THEN GOSUB 9900
3130 RETURN
```

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```
3200 V=1
3202 PRINT "▩"
3205 PRINT "MADRID 11th JULY 1982"
3300 FOR I=1 TO 6
3310 PRINT " "
3320 NEXT I
3330 PRINT "1982 WORLD CUP FINAL"
3340 PRINT "==== ===== === ====="
3342 PRINT A$(N1(1));" V. ";A$(N1(2))
3350 GOSUB 9930
3360 GOSUB 9930
3362 PRINT "▩"
3370 E1=0:E2=0
3380 X1=N1(1):X2=N1(2)
3382 IF X1=T THEN Z=X2:GOSUB 9000:E1=B:E2=C:GOTO 3400
3384 IF X2=T THEN Z=X1:GOSUB 9000:E1=C:E2=B:GOTO 3400
3390 GOSUB 4400
3400 RETURN
3410 REM CHECK IF YOU'RE PLAYING
3420 FOR I=1 TO W6
3430 IF(M(I,H2)-T)*(M(I,A2)-T)=0 THEN GOSUB 3500
3440 NEXT I
3442 RETURN
3450 REM GET SCOUT'S REPORT
3452 D4=0
3455 IF (Z-S1)*(Z-S2)*(Z-S3)*(Z-S4)=0 THEN D4=1
3460 IF D4=1 THEN J$="YOUR SCOUTS HAVE BEEN WATCHING "+A$(Z):GOSUB 15000
3462 E=Z
3465 IF D4=1 THEN GOSUB 9900
3467 GOSUB 8400
3470 RETURN
3500 REM SLOT IN VALUE OF OPPOSITION
3510 IF M(I,H2)<>T THEN Z=M(I,H2)
3520 IF M(I,H2)=T THEN Z=M(I,A2)
3530 GOSUB 9000
3540 RETURN
3800 REM TYPE IN OPPOSITION TEAM
3810 PRINT"▩":PRINT"DO YOU WISH TO TYPE IN THE OPPOSITION   PLAYERS' NAMES?"
3820 INPUT"TYPE Y OR N  ";D3$
3822 IF ASC(LEFT$(D3$,1))<>89 THEN GOSUB 12570: RETURN
3823 FOR I=1 TO 12
3825 PRINT"TYPE IN THE NAME OF PLAYER";I
3830 INPUT Z9$(I)
3832 NEXT I
3840 RETURN
4000 REM SEMI-FINALISTS
4010 S8(I)=T9(J)
4020 RETURN
4200 PRINT "▩"
4210 PRINT "1982 WORLD CUP SEMI-FINALS"
4220 PRINT "==== ===== === ==========="
4230 FOR I=1 TO 4
4240 PRINT " "
4250 NEXT I
4260 PRINT A$(S8(1));TAB(16);"V.       ";A$(S8(3))
4270 FOR I=1 TO 4
4280 PRINT " "
4290 NEXT I
4300 PRINT A$(S8(2));TAB(16);"V.       ";A$(S8(4))
4302 FOR I=1 TO 6
4304 PRINT " "
4306 NEXT I
4310 GOSUB 9900
4320 RETURN
4400 REM PLAY SEMI-FINAL,FINAL
4410 FOR I=1 TO 90
4420 IF RND(1)>86/90THEN GOSUB 4600
4425 IF I=45 THEN GOSUB 4900
4430 IF I/10=INT(I/10)THEN GOSUB 4800
4440 NEXT I
4450 IF E1=E2 THEN GOSUB 4700
4460 PRINT "FINAL SCORE "
4470 PRINT A$(X1);E1;" ";A$(X2);E2
4475 W5=W5+1
4476 IF V=1 THEN RETURN
4480 IF E1>E2 THEN N1(W5)=X1
4500 IF E2>E1 THEN N1(W5)=X2
4510 RETURN
4600 R7=RND(1)
4601 PRINT "▩"
4602 R9=R(X1)/(R(X1)+R(X2))
4605 IF R7=R9 THEN 4600
4610 IF R7<R9 THEN J$=A$(X1)+" HAVE SCORED AFTER "+STR$(I)+" MINUTES"
4611 IF I=1 THEN J$=LEFT$(J$,LEN(J$)-1)
4612 IF R7<R9 THEN GOSUB 15000
4615 IF R7<R9 THEN E1=E1+1
4620 IF R7>R9 THEN J$=A$(X2)+" HAVE SCORED AFTER "+STR$(I)+" MINUTES"
4621 IF R7>R9 THEN GOSUB 15000
4625 IF R7>R9 THEN E2=E2+1
4627 GOSUB 9930
4630 RETURN
4700 PRINT "▩"
4702 PRINT "AFTER EXTRA TIME"
4705 R4=FNA(2)
4710 IF R4=1 THEN E1=E1+FNA(3)
4720 IF R4=2 THEN E2=E2+FNA(3)
4725 GOSUB 9930
4730 RETURN
4800 PRINT "▩"
4805 PRINT "SCORE AFTER ";I;" MINUTES ";":"
4810 PRINT A$(X1);" ";E1;" ";A$(X2);" ";E2
4815 GOSUB 9930
4820 RETURN
4900 PRINT " "
4910 PRINT "HALF TIME SCORE:"
```

Continued from page 33

Then it's out of your hands and the two teams are up against one another with a running commentary of events. Keep a close check on which of your players seem to lose possession and play badly, these are the one's you will want to substitute. A good substitution will improve your play — a bad one will give the opposition more chance.

Also watch for which team is gaining the most possession in midfield — you may need to change your formation or tactics here. Check on how the goals are scored — it could be important to tighten up your defence to certain situations or to find out which of your own attacking ploys is paying dividends.

Half-time comes around and this is your chance to change your tactics if you have noticed things going wrong.

At the end of the day, win, lose or draw, you will have to sit back and watch the other results of the day being typed out and see if your predictions are coming true.

And on you go, hopefully towards a place in the final.

The game is run on exactly the same lines as the World Cup with the winners of Group 1 going into Group A and the runners-up into Group C; Group 2 winners into Group B and runners-up into Group D; Group 3 winners into Group A and runners-up into Group C; Group 4 winners into Group C and runners-up into Group A; Group 5 winners into Group D and runners-up into Group B; Group 6 winners into Group B and runners-up into Group D.

The first semi-final is between the winners of Group A and C and the other between the winners of Group B and D.

```
4920 PRINT " "
4930 PRINT A$(X1);" ";E1;" ";A$(X2);" ";E2
4940 PRINT " "
4945 GOSUB 9930
4950 RETURN
5000 REM INITIAL GROUP FIXTURES
5004 W6=6
5005 D1=12
5010 H2=1:A2=2:GOSUB 5020
5011 H2=3:A2=4:GOSUB 5020
5012 H2=1:A2=3:GOSUB 5020
5013 H2=2:A2=4:GOSUB 5020
5014 H2=1:A2=4:GOSUB 5020
5015 H2=2:A2=3:GOSUB 5020
5016 RETURN
5020 D1=D1+1
5021 GOSUB 3410
5022 PRINT"♥"
5024 PRINT "RESULTS FOR ";D1;" JUNE '82"
5026 PRINT " "
5027 FOR I=1 TO 6
5028 H=M(I,H2):A=M(I,A2)
5029 IF H=T THEN B=P2:C=P3:GOTO 5035
5030 IF T=A THEN B=P3:C=P2:GOTO 5035
5032 GOSUB 7000
5035 PRINT "GROUP";I;" ";A$(H);B;" ";A$(A);C
5040 NEXT I
5041 IF D1=18 THEN GOSUB 7200
5042 PRINT " "
5043 IF D1=18 THEN RETURN
5044 PRINT "PRESS L TO DISPLAY LEAGUE TABLES"
5045 PRINT "       ANY OTHER KEY TO CONTINUE"
5046 GET Z$
5048 IF Z$="" THEN GOTO 5046
5049 IF Z$="L" THEN GOSUB 7200
5050 RETURN
5100 REM PRINT GROUPS A-D
5105 PRINT "♥"
5106 PRINT "GROUPS FOR THE SECOND STAGE ARE :-"
5107 PRINT " "
5110 FOR I=1 TO 2
5120 PRINT "GROUP ";CHR$(64+I);TAB(20);"GROUP ";CHR$(66+I)
5130 PRINT " "
5140 FOR J=1 TO 3
5150 PRINT A$(G2(I,J));TAB(20);A$(G2(I+2,J))
5160 NEXT J
5165 PRINT " "
5170 NEXT I
5189 RETURN
5200 REM SECOND STAGE FIXTURES
5205 W6=4
5210 D1=27
5220 H2=1:A2=2:GOSUB 5300
5230 H2=3:A2=1:GOSUB 5300
5240 H2=2:A2=3:GOSUB 5300
5250 RETURN
5300 REM SECOND STAGE FIXTURES
5302 GOSUB 8310
5310 GOSUB 3410
5322 PRINT"♥"
5324 PRINT "RESULTS FOR ";D1;" JUNE '82"
5326 PRINT " "
5327 FOR I=1 TO 4
5329 H=G2(I,H2):A=G2(I,A2)
5330 IF H=T THEN B=P2:C=P3:GOTO 5335
5331 IF T=A THEN B=P3:C=P2:GOTO 5335
5332 GOSUB 7000
5335 PRINT "GROUP ";CHR$(I+64);" ";A$(H);B;" ";A$(A);C
5340 NEXT I
5341 IF D1=29 THEN GOSUB 7200
5342 PRINT " "
5343 IF D1=29 THEN RETURN
5344 PRINT "PRESS L TO DISPLAY LEAGUE TABLES"
5345 PRINT "       ANY OTHER KEY TO CONTINUE"
5346 GET Z$
5348 IF Z$="" THEN GOTO 5346
5349 IF Z$="L" THEN GOSUB 7200
5350 D1=D1+1
5352 RETURN
5400 REM GENERATE TEAM TACTICS
5410 FOR I=1 TO 24
5412 S5(I)=FNA(3)
5414 S6(I)=FNA(3)
5416 S7(I)=FNA(3)
5420 T5(I)=FNA(3)
5430 T6(I)=FNA(3)
5440 T7(I)=FNA(3)
5450 T8(I)=FNA(3)
5460 NEXT I
5470 RETURN
5480 REM GET DESCRIPTION OF FREEKICK TACTICS
5490 IF F1=1 THEN C$=" DIRECT SHOT "
5500 IF F1=2 THEN C$=" CHIP TO THE FAR POST "
5510 IF F1=3 THEN C$=" TEE-UP FOR SHOT "
5520 RETURN
5530 REM DESCRIPTION OF CORNER TACTICS
5540 IF F1=1 THEN C$=" PLAY IT SHORT "
5550 IF F1=2 THEN C$=" AIM FOR THE FAR POST "
5560 IF F1=3 THEN C$=" AIM FOR THE NEAR POST "
5570 RETURN
5580 REM DESCRIPTION OF ATTACK TACTICS
5590 IF F1=1 THEN C$=" FAST BREAK "
5600 IF F1=2 THEN C$=" EARLY CROSS "
5610 IF F1=3 THEN C$=" SLOW BUILD-UP "
5620 RETURN
5630 REM MIDFIELD TACTICS
5640 IF F1=1 THEN C$=" TACKLE HARD "
5650 IF F1=2 THEN C$=" MARK TIGHT "
5660 IF F1=3 THEN C$=" FIND SPACE "
5670 RETURN
5680 REM FREEKICK DEFENCE
5690 IF F1=1 THEN C$=" MAKE A WALL "
5700 IF F1=2 THEN C$=" MARK MAN-TO-MAN "
5710 IF F1=3 THEN C$=" RUSH THE KICKER "
5720 RETURN
5730 REM CORNER DEFENCE
5740 IF F1=1 THEN C$=" MOVE OUT FAST "
5750 IF F1=2 THEN C$=" RELY ON THE GOALKEEPER "
5760 IF F1=3 THEN C$=" USE CLOSE MARKING "
5770 RETURN
5780 REM DEFENCE TACTICS
5790 IF F1=1 THEN C$=" USE A SWEEPER "
5800 IF F1=2 THEN C$=" INTERCEPT PASSES "
5810 IF F1=3 THEN C$=" SHADOW ATTACKERS "
5820 RETURN
5830 IF F1=1 THEN C$=" A 4-3-3 "
5840 IF F1=2 THEN C$=" A 4-4-2 "
5850 IF F1=3 THEN C$=" A 4-2-4 "
5860 RETURN
6000 REM CHOOSE TEAMS FOR SCOUTS TO WATCH
6005 PRINT"♥"
6010 PRINT "SCOUTS CAN COMPILE DOSSIERS ON 4 TEAMS"
6020 PRINT "ENTER FOUR NUMBERS FROM THE FOLLOWING:"
6030 PRINT "SEPARATED BY COMMAS"
6040 X=2
6050 GOSUB 1295
6060 INPUT S1,S2,S3,S4
6070 IF (S1-T)*(S2-T)*(S3-T)*(S4-T)=0 THEN GOTO6200
6072 IF (S1-S2)*(S1-S3)*(S1-S4)*(S2-S3)*(S2-S4)*
     (S3-S4)=0 THEN 6200
6080 IF S1<1 THEN GOTO 6200
6090 IF S2<1 THEN GOTO 6200
6100 IF S3<1 THEN GOTO 6200
6110 IF S4<1 THEN GOTO 6200
6120 IF S4>24 THEN GOTO 6200
6130 IF S3>24 THEN GOTO 6200
6140 IF S2>24 THEN GOTO 6200
6150 IF S1>24 THEN GOTO 6200
6160 RETURN
6200 PRINT "RE-ENTER 4 NUMBERS FROM ABOVE LIST"
6210 GOTO 6060
7000 REM PLAYS TEAM H V. TEAM A
7010 REM MATCH SCORE IS B C
7011 B=0:C=0
7012 IF FNA(100)<60 THEN GOTO 7030
7020 B=H1(F(H),F(A)):C=A1(F(H),F(A))
7030 B1=FNA(8):C1=FNA(8)
7032 B1=B1+R(H):C1=C1+R(A)
7040 D=INT((ABS(B1-C1))/5)
7042 IF D<>0 THEN 7080
7050 B=B+FNA(2)-1
7060 C=C+FNA(2)-1
7070 IF FNA(2)=2 THEN GOTO 7100
7072 IF R(H)>R(A) THEN B=B+FNA(2)-1
7074 IF R(A)>R(H) THEN C=C+FNA(2)-1
7078 GOTO 7100
7080 IFB1>C1THEN B=B+D
7090 IFC1>B1THEN C=C+D
7092 IF FNA(500)> 498 THEN B=B+FNA(3)
7094 IF FNA(500)> 498 THEN C=C+FNA(3)
7100 M2(H)=M2(H)+1:M2(A)=M2(A)+1
7110 M1 (H,M2(H))=A
7120 M1 (A,M2(A))=H
7130 M1 (H,M2(H)+7)=B
7140 M1 (A,M2(A)+7)=C
7150 M1 (H,M2(H)+14)=C
7160 M1 (A,M2(A)+14)=B
7170 RETURN
7200 REM
7201 PRINT"♥CALCULATING LEAGUE TABLES"
7202 IF W6=4 THEN GOSUB 8300
7204 IF W6=4 THEN GOTO 7210
7206 K1=1:K2=3:J1=4
7210 FOR I=1 TO W6
7220 GOSUB 7500
7230 GOSUB 7900
7235 IF W6+I-9=0THEN PRINT"♥CALCULATING LEAGUE TABLES"
7240 NEXT I
7250 RETURN
7500 REM WORKOUT LEAGUE POSITIONS
7502 FOR J=1 TO J1
7504 Q(J)=0:F9(J)=0:A9(J)=0:P9(J)=0:W(J)=0:D8(J)=0:D9(J)=0
7506 NEXT J
7510 FOR J=1 TO J1
7520 T9(J)=M(I,J)
7530 FOR K=K1 TO K2
7540 IF M1(T9(J),K)=0 THEN GOTO7600
7550 F9(J)=M1(T9(J),K+7)+F9(J)
7560 A9(J)=M1(T9(J),K+14)+A9(J)
7562 Z7=M1(T9(J),K+7)
7564 Z6=M1(T9(J),K+14)
7570 D8(J)=Z7-Z6+D8(J)
7580 Q(J)=Q(J)+1
7585 IF Z7=Z6THEN D9(J)=D9(J)+1
7590 IF Z6<Z7THEN W(J)=W(J)+1
7592 IF Z6<Z7THEN P9(J)=P9(J)+2
7594 IF Z6=Z7THEN P9(J)=P9(J)+1
7600 NEXT K
7605 NEXT J
7606 F2=0
```

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7610 FOR J=1 TOJ1-1
7620 IF P9(J)<P9(J+1) THEN GOSUB 7800
7630 IF P9(J)=P9(J+1) THEN GOSUB 7700
7640 NEXT J
7650 IF F2=1 THEN GOTO 7606
7660 RETURN
7700 REM TEST GOAL DIFFERENCE
7710 IF D8(J)<D8(J+1) THEN GOSUB 7800
7720 IF D8(J)<>D8(J+1) THEN RETURN
7730 IF F9(J)<F9(J+1) THEN GOSUB 7800
7740 IF F9(J)<>F9(J+1) THEN RETURN
7750 IF FNA (2)=1 THEN GOSUB 7800
7760 RETURN
7800 REM SWAP TEAMS POSITIONS
7810 F3 =T9(J):T9(J)=T9(J+1):T9(J+1)=F3
7820 F3 =F9(J):F9(J)=F9(J+1):F9(J+1)=F3
7825 F3 =A9(J):A9(J)=A9(J+1):A9(J+1)=F3
7830 F3 =D8(J):D8(J)=D8(J+1):D8(J+1)=F3
7835 F3 =D9(J):D9(J)=D9(J+1):D9(J+1)=F3
7840 F3 =P9(J):P9(J)=P9(J+1):P9(J+1)=F3
7845 F3 =W(J):W(J)=W(J+1):W(J+1)=F3
7850 F3 =Q(J):Q(J)=Q(J+1):Q(J+1)=F3
7860 F2=1
7870 RETURN
7900 REM PRINT LEAGUE POSITIONS
7902 PRINT " "
7904 F$="F ":A4$="A "
7905 IF W6=6 THEN B$=CHR$(I+48)
7906 IF W6=4 THEN B$=CHR$(I+64)
7910 PRINT "GROUP ";B$;" LEAGUE TABLE"
7912 FOR J=1 TO J1
7914 IF F9(J)>9 THEN F$="F  "
7916 IF A9(J)>9 THEN A4$=" A "
7918 NEXT J
7920 PRINT " "
7925 PRINT TAB(20);" P W D L ";F$;A4$;"Pts."
7930 FOR J=1 TO J1
7932 P4$="":P5$=""
7935 L9=Q(J)-W(J)-D9(J)
7936 IF F$="F  " THEN GOTO 7990
7937 IF A4$=" A " THEN GOTO 7994
7940 V1$=STR$(J)+". "+A$(T9(J))
7942 PRINT V1$;TAB(20);Q(J);W(J);D9(J);L9;P4$;F9(J);P5$;
     A9(J);" ";P9(J)
7943 IF W6+J-5=0 THEN GOSUB 4000
7944 IF W6=4THEN 7950
7946 IF J<3 THEN GOSUB 8900
7950 NEXT J
7951 IF W6=6 THEN 7956
7952 IF I<4 THEN 7985
7954 GOTO 7960
7956 IF I<3 THEN 7985
7958 IF (I-4)*(I-5)=0 THEN 7985
7960 PRINT "PRESS ANY KEY TO CONTINUE"
7970 GET Z$
7980 IF Z$="" THEN GOTO 7970
7985 RETURN
7990 IF F9(J)<10 THEN P4$=" "
7992 GOTO 7937
7994 IF A9(J)<10 THEN P5$=" "
7996 GOTO 7940
8300 K1=4:K2=5:J1=3
8310 FOR I=1 TO 4
8320 FOR J=1 TO 3
8330 M(I,J)=G2(I,J)
8340 NEXT J
8350 NEXT I
8360 RETURN
8400 REM SCOUT'S REPORT
8412 PRINT"PROFILE ON ";A$(E):PRINT" "
8414 GOSUB 8600
8415 PRINT" "
8418 F1=S5(E)
8420 GOSUB 5780
8425 PRINT" "
8430 PRINT "IN DEFENCE THEY";C$
8432 PRINT" "
8440 F1=S6(E):GOSUB 5580
8450 PRINT "IN ATTACK THEY USE THE";C$
8452 PRINT" "
8460 F1=S7(E):GOSUB 5630
8470 PRINT "IN MIDFIELD THEY";C$
8472 PRINT" "
8473 IF D4=0 THEN GOSUB 9900:RETURN
8480 F1=T5(E):GOSUB 5460
8482 PRINT "IN FREEKICKS AROUND THE BOX THEY USE A":PRINTC$
8490 F1=T6(E):GOSUB 5680
8500 PRINT "AND DEFENDING AGAINST FREEKICKS THEY":PRINTC$
     :PRINT" "
8510 F1=T7(E):GOSUB  5530
8520 PRINT"FROM A CORNER THEY";C$
8530 F1=T8(E):GOSUB 5730
8540 PRINT"WHEN FACED WITH A CORNER THEY":PRINTC$:PRINT" "
8550 F1=F(E):GOSUB 5830
8560 PRINT"THEY NORMALLY PLAY";C$;"FORMATION"
8562 PRINT" "
8565 GOSUB9900
8570 RETURN
8600 REM PRINT PAST RESULTS
8605 IF M2(E)=0THEN RETURN
8610 PRINT" "
8620 PRINT"RESULTS SO FAR IN WORLD CUP"
8622 PRINT" "
8630 FOR I=1 TO M2(E)
8640 PRINTA$(E);M1(E,I+7);" ";A$(M1(E,I));M1(E,I+14)
8650 NEXT I
8652 PRINT" "
8654 GOSUB 9900
8660 RETURN
8670 REM SELECT TACTICS
8672 PRINT"■"
8675 PRINT"WHAT FORMATION SHALL WE PLAY BOSS?"
8680 PRINT" "
8685 FOR F1 =1 TO 3
8690 GOSUB 5830
8695 PRINTF1;" ";C$
8700 NEXT F1
8702 PRINT" "
8705 GOSUB 9960
8710 F(T)=E9
8712 PRINT" "
8715 PRINT"WHAT ARE THE DEFENSIVE PLANS BOSS?"
8720 PRINT" "
8725 FOR F1 =1 TO 3
8730 GOSUB 5780
8735 PRINTF1;" ";C$
8740 NEXT F1
8742 PRINT" "
8745 GOSUB 9960
8747 PRINT" "
8750 S5(T)=E9
8755 PRINT"WHAT ARE THE ATTACKING PLANS GUV?"
8760 PRINT" "
8765 FOR F1 =1 TO 3
8770 GOSUB 5580
8775 PRINTF1;" ";C$
8780 NEXT F1
8782 PRINT" "
8785 GOSUB 9960
8790 PRINT" "
8795 S6(T)=E9
8800 PRINT"WHAT IS THE MIDFIELD SCHEME BOSS?"
8802 PRINT" "
8804 FOR F1 =1 TO 3
8806 GOSUB 5630
8808 PRINTF1;" ";C$
8810 NEXT F1
8812 PRINT" "
8814 GOSUB 9960
8816 PRINT" "
8818 S7(T)=E9
8820 PRINT"WHAT IF WE GET A FREEKICK UPFIELD BOSS?"
8822 PRINT" "
8824 FOR F1 =1 TO 3
8826 GOSUB 5480
8828 PRINTF1;" ";C$
8830 NEXT F1
8832 PRINT" "
8834 GOSUB 9960
8836 PRINT" "
8838 T5(T)=E9
8840 PRINT"HOW DO WE DEFEND AGAINST A FREEKICK?"
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8842 PRINT" "
8844 FOR F1 =1 TO 3
8846 GOSUB 5680
8848 PRINTF1;" ";C$
8850 NEXT F1
8852 PRINT" "
8854 GOSUB 9960
8856 PRINT" "
8858 T6(T)=E9
8860 PRINT"WHAT SHALL WE DO
     WITH OUR CORNERS?"
8862 PRINT" "
8864 FOR F1 =1 TO 3
8866 GOSUB 5530
8868 PRINTF1;" ";C$
8870 NEXT F1
8872 PRINT" "
8874 GOSUB, 9960
8876 PRINT" "
8878 T7(T)=E9
```

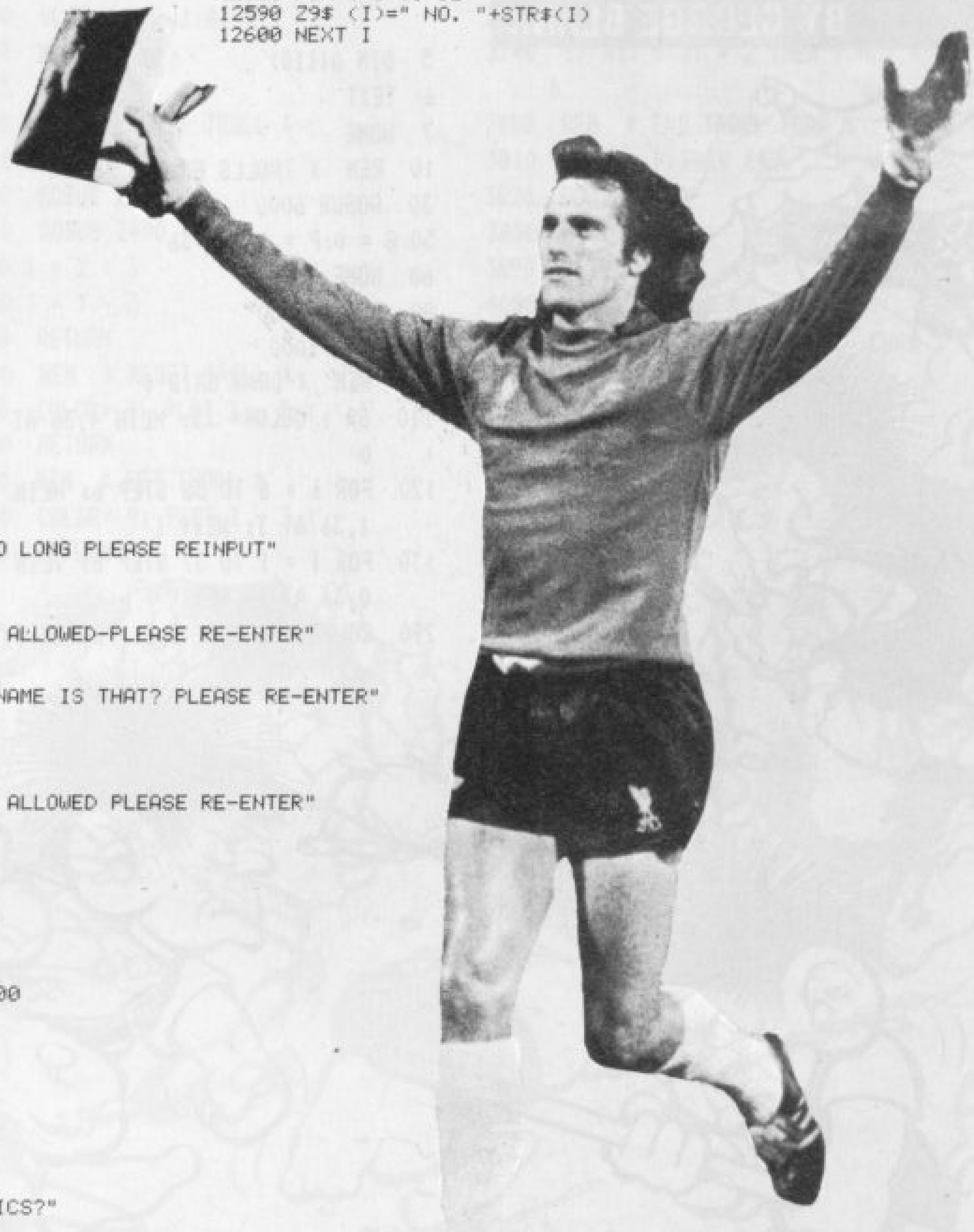
```
8879 PRINT"WHAT ABOUT THEIR CORNERS?"
8880 PRINT" "
8881 FOR F1 =1 TO 3:GOSUB 5730
8882 PRINTF1;" ";C$
8883 NEXT F1
8884 PRINT" "
8885 GOSUB 9960
8886 PRINT" "
8888 T8(T)=E9
8889 RETURN
8900 ON I GOTO 8910,8920,8930,8940,8950,8960
8905 RETURN
8910 IF J=1 THENG2(1,1)=T9(J)
8915 IF J=2 THENG2(3,1)=T9(J)
8918 GOTO 8905
8920 IF J=1 THENG2(2,1)=T9(J)
8925 IF J=2 THENG2(4,1)=T9(J)
8928 GOTO 8905
8930 IF J=1 THENG2(1,2)=T9(J)
8935 IF J=2 THENG2(3,2)=T9(J)
8938 GOTO 8905
8940 IF J=1 THENG2(3,3)=T9(J)
8945 IF J=2 THENG2(1,3)=T9(J)
8948 GOTO 8905
8950 IF J=1 THENG2(4,2)=T9(J)
8955 IF J=2 THENG2(2,2)=T9(J)
8958 GOTO 8905
8960 IF J=1 THENG2(2,3)=T9(J)
8965 IF J=2 THENG2(4,3)=T9(J)
8968 GOTO 8905
9000 REM PLAY GAME
9001 PRINT"■":PRINTA$(T);" V. ";A$(Z):PRINT" "
9002 B=0:C=0:B4=0:B5=0:B6=0
9003 GOSUB 3450
9004 GOSUB 8670
9005 GOSUB 3800
9010 Z3=0:Z4=0:W1=0
9012 K4=T4(S7(T),S7(Z))+30
9015 W3=R(T):W4=R(Z)
9016 W3=W3+2*H1(F(T),F(Z)):W4=W4+2*H1(F(Z),F(T))
9017 FOR I=1 TO 11:U2(I)=0:NEXT I
9018 U1=0
9019 PRINT"■":PRINT"THE REF BLOWS HIS WHISTLE TO START GAME"
9020 FOR I=1 TO K4
9025 Z1=T
9030 IF FNA(W3+W4)>R(T) THEN Z1=Z
9032 IF Z1=T THEN Z8=Z
9034 IF Z1=Z THEN Z8=T
9040 GOSUB 9800
9050 Z8$=" HAVE "
9052 GOSUB 9700
9055 PRINTA$(Z1);Z8$;"POSSESSION"
9056 PRINT" "
9070 IF Z1=T THEN GOSUB 9760
9080 IF Z1=Z THEN GOSUB 9780
9090 J$=Z5$+T4$(G1)+Z6$:GOSUB 15000
9092 PRINT" "
9094 GOSUB 9930
9100 Z4=Z2:Z3=Z1
9102 IF Z2=1 THEN U1=U1+1:U2(A3)=U2(A3)+1
9110 IF Z2=2 THEN GOSUB 9300
9112 IF I=22 THEN GOSUB 18000
9200 NEXT I
9201 H=T:A=Z
9202 PRINT"NOTHING ELSE OF SIGNIFICANCE HAPPENS
     DURING THE GAME"
9203 PRINT" ":PRINT"FINAL SCORE"
9204 PRINT" ":PRINTA$(T);B;" ";A$(Z);C
9205 P2=B:P3=C
9206 GOSUB 9900
9207 IF X3=0 THEN GOSUB 7100:RETURN
9208 IF B=C THEN 9211
9209 IF V=0 THEN RETURN
9210 GOSUB 7100:RETURN
9211 IF X5=1 THEN 9220
9212 Z3=0:Z4=0:K4=15
9214 X5=1
9216 PRINT"■":PRINT "EXTRA TIME BEING PLAYED"
9218 GOTO9020
9220 X5=0
9222 PRINT"■":PRINT "PENALTIES WILL DECIDE THE RESULT"
9223 J$=" SHOOTS WIDE"
9224 IF RND(1) >.5 THEN B=B+1:J$=" SCORES FROM THE SPOT"
9226 J$=K$(1+FNA(10))+J$:GOSUB15000
9228 J$=" SHOOTS WIDE"
9230 IF RND(1)>.5 THEN C=C+1:J$=" SCORES FROM THE SPOT"
9232 J$=Z9$(1+FNA(10))+J$:GOSUB15000
9234 IF B=C THEN 9223
9236 PRINT"FINAL SCORE "
9238 PRINTA$(T);B;" ";A$(Z);C
9240 P2=B:P3=C
9245 GOSUB 9900
9250 RETURN
9300 REM SCORING CHANCE
9302 Z4=1
9305 G3=FNA(7)
9307 IF G1<8 THEN Z1$=Z6$
9309 IF G1>7 THENZ1$=Z5$
9310 ON G3 GOSUB 9350,9350,9350,9350,9450,9450,9500
9349 RETURN
9350 REM NORMAL ATTACK
9355 G3=FNA(100)
9360 IF T3(S6(Z3),S5(Z8))>100-G3+B4 THEN 9400
9365 GOSUB 9375
9366 RETURN
9375 G3=FNA(9)
9380 Z1$=Z1$+A1$(G3)
9382 IF Z8=T THEN H$=" "+K$(1+FNA(4))
9384 IF Z8=Z THEN H$=" "+Z9$(1+FNA(4))
9385 IF G3<4 THEN Z1$=Z1$+H$
9386 IF G3<4 THEN J$=Z1$:GOSUB 15000:Z2=1:RETURN
9387 IF Z8=T THEN H$=" "+K$(1)
9388 IF Z8=Z THEN H$=" "+Z9$(1)
9389 IF G3<6 THEN J$=Z1$+H$:GOSUB 15000:RETURN
9390 J$=Z1$:GOSUB 15000:RETURN
9400 REM GOAL IS SCORED
9402 PRINT " "
9404 B4=B4+2.5
9405 J$=Z1$+A2$(FNA(9)):GOSUB 15000
9406 GOSUB 9410:GOSUB 9640
9407 IF I=K4 THEN RETURN
9408 PRINT"FROM THE KICK OFF"
9409 RETURN
9410 J$="IT'S A GOAL! "+A$(Z1)+" HAVE SCORED":GOSUB 15000
9415 IF Z1=T THENB=B+1
9420 IF Z1=Z THEN C=C+1
9422 D2=I*2
9423 IF RND(1)>.5 THEN D2=D2-1
9425 PRINT" "
9426 Z$=" MINUTES"
9427 IFD2=1 THEN Z$=" MINUTE"
9428 PRINT "SCORE AFTER ";D2;Z$
9430 PRINT " "
9432 PRINT A$(T);B;" ";A$(Z);C
9440 Z2=1
9449 RETURN
9450 REM CORNER
9452 PRINT" ":PRINT A$(Z1);" WIN A CORNER"
9455 PRINT" "
9456 IF Z1=T THEN Z1$=K$(5+FNA(6))
9458 IF Z1=Z THEN Z1$=Z9$(5+FNA(6))
9460 J$="FROM THE KICK THE BALL REACHES"+" "+Z1$
     :GOSUB 15000
9465 G3=FNA(100)
9470 IF T2(S6(Z3),S5(Z8))>100-G3+B6THEN B6=B6+2:GOTO 9400
9475 GOSUB 9375
9499 RETURN
9500 REM SET-PIECE
9502 PRINT" "
9510 IF Z1=T THEN Z5$=Z9$(1+FNA(4))
9512 IF Z1=Z THEN Z5$=K$(1+FNA(4))
9514 J$=Z1$+" IS BROUGHT DOWN BY "+Z5$+".THE REF
     AWARDS "+A$(Z1)
9516 J$=J$+" A FREEKICK JUST OUTSIDE THE BOX":GOSUB 15000
9520 PRINT" "
9525 PRINT"FROM THE FREEKICK "
9530 G3=FNA(100)
9532 IF T3(S6(Z3),S5(Z8))>100-G3+B5 THEN B5=B5+2:GOTO 9400
9534 GOSUB 9375
9536 RETURN
9600 REM DETERMINE PLAYER TO PRINT
9640 REM BRING ON SUB?
9645 IF W1=1 THEN GOSUB 9900:RETURN
9647 PRINT"PRESS S TO BRING ON SUBSTITUTE"
9648 PRINT"      ANY OTHER KEY TO CONTINUE"
9649 GET Z$
9650 IF Z$="" THEN 9649
9651 IF ASC(Z$)<>83 THEN RETURN
9655 PRINT"■"
9656 W1=1
9660 FOR J=2 TO 11:PRINTJ;" ";K$(J):NEXT J
9665 PRINT"PLEASE TYPE A NUMBER FROM 2 TO 11"
9666 PRINT"TO INDICATE THE PLAYER TO BE SUBSTITUTED"
9667 INPUT K
9668 IF K>11 THEN9667
9669 IF K<2 THEN 9667
9670 PRINT" ":J$=K$(K)+" TRUDGES OFF TO BE REPLACED BY "
     +K$(12):GOSUB 15000
9675 Z$=K$(K):K$(K)=K$(12):K$(12)=Z$
9680 W3=W3+(-(U1/10)+U2(K))*2
9685 RETURN
9700 REM DETERMINE IF POSS. REGAINED
9710 REM IF Z1<>1 THEN RETURN
9720 IF Z4<>1 THEN RETURN
9730 IF Z3<>Z1 THEN RETURN
9740 Z8$=" REGAIN "
9750 RETURN
9760 REM GENERATE 2 RANDOM PLAYERS
9762 A3=FNA(10)+1
9764 Z5$=K$(A3)
9766 IF G1>10 THEN Z6$=Z9$(FNA(10)+1)
9768 IF G1>10 THEN RETURN
9770 A4=FNA(10)+1
9772 IF A4=A3 THEN 9770
9774 Z6$=K$(A4)
9776 RETURN
9780 REM GENERATE 2 RANDOM PLAYERS
9782 A3=FNA(10)+1
9784 Z5$=Z9$(A3)
9786 IF G1>10 THEN Z6$=K$(FNA(10)+1)
9788 IF G1>10 THEN RETURN
9790 A4=FNA(10)+1
9792 IF A4=A3 THEN 9790
9794 Z6$=Z9$(A4)
9796 RETURN
9800 REM DETERMINE SUCCESS OF POSS.
9810 G1=FNA(20)
9820 IF G1<4 THEN Z2=1
9830 IF G1<4 THEN RETURN
9840 IF G1>17 THEN Z2=1
```

```
9850 IF G1>17 THEN RETURN
9860 Z2=2
9870 RETURN
9900 PRINT "PRESS ANY KEY TO CONTINUE"
9905 GET Z$
9910 IF Z$="" THEN 9905
9920 RETURN
9930 FOR U=1 TO 1200
9940 NEXT U
9950 RETURN
9960 REM INPUT NUMBER FROM 1 TO 3
9964 INPUT "ENTER A NUMBER BETWEEN 1 AND 3:";E$
9966 IF LEN(E$)<>1 THEN 9990
9967 IF ASC(E$)<49 THEN 9990
9968 IF ASC(E$)>51 THEN 9990
9969 E9=VAL(E$)
9980 RETURN
9990 PRINT "PLEASE RE-ENTER"
9992 GOTO 9964
11062 FOR I=1 TO 24
11064 F(I)=INT(RND(1)*3)+1
11066 NEXT I
11068 RETURN
11070 FOR I=1 TO 24
11080 READ A$(I)
11090 NEXT I
11092 RETURN
11094 FOR I=1 TO 3
11095 FOR J=1 TO 3
11096 READ H1(I,J):READ A1(I,J)
11097 NEXT J
11098 NEXT I
11100 RETURN
11110 FOR I=1 TO 20
11120 READ T4$(I)
11130 NEXT I
11140 RETURN
12100 REM GENERATE TEAM'S RATINGS
12110 FOR I=1 TO 3
```

Longer listings are best! That's the message you keep drumming into us on the telephone and by letter. Well, they don't come much longer than World Cup Manager and we hope you take the trouble to key it in. But for any Sharp owners who feel it will be too risky or time consuming to type it, a cassette of the game is available from Sharpsoft. It costs £5.75 and can be bought from Sharpsoft, 86/90 Paul Street, London EC1.

```
12605 Z9$(1)=" THEIR GOALKEEPER "
12610 RETURN
12615 REM GENERATE GOALSCORING MESSAGES
12620 FOR I=1 TO 9
12630 READ A1$(I)
12635 NEXT I
12640 FOR I=1 TO 9
12650 READ A2$(I)
12660 NEXT I
12670 RETURN
14000 REM CHECK VALIDITY OF NAME
14005 K3=46
14010 PRINT D$:INPUT K$(I)
14020 IF LEN(K$(I))>35THEN PRINT "NAME IS TO LONG PLEASE REINPUT"
14030 IF LEN(K$(I))>35 THEN 14010
14040 FOR K1=1 TO LEN(K$(I))
14050 K2=ASC(MID$(K$(I),K1,1))
14060 IF K2>90 THEN PRINT "ONLY LETTERS ARE ALLOWED-PLEASE RE-ENTER"
14070 IF K2>90 THEN GOTO 14010
14080 IF K2=32 THEN GOTO 14110
14082 IF K2+K3-90<3THEN PRINT"WHAT SORT OF NAME IS THAT? PLEASE RE-ENTER"
14083 IF K2+K3-90<3THEN 14010
14085 IF K2=39 THEN 14110
14088 IF K2=45 THEN 14110
14089 IF K2=46 THEN 14110
14090 IF K2<65 THEN PRINT "ONLY LETTERS ARE ALLOWED PLEASE RE-ENTER"
14100 IF K2<65 THEN GOTO 14010
14110 K3=K2
14115 NEXT K1
14120 RETURN
15000 IF LEN(J$)<=39 THEN PRINT J$
15005 IF LEN(J$)<39 THENPRINT" "
15010 IF LEN(J$)<=39 THEN RETURN
15029 FOR J=39 TO 1 STEP-1
15030 IF ASC(MID$(J$,J,1))=32 THEN GOTO 16000
15040 NEXT J
15050 PRINT J$
15060 RETURN
16000 PRINTLEFT$(J$,J)
16010 J$=RIGHT$(J$,LEN(J$)-J)
16020 GOTO 15000
18000 PRINT " "
18010 PRINT"HALFTIME SCORE:"
18020 PRINT A$(T);B;" ";A$(Z);C
18030 PRINT"DO YOU WISH TO CHANGE YOUR TACTICS?"
18040 INPUT Z$
18045 IF ASC(LEFT$(Z$,1))=89 THEN GOSUB 8670
18050 GOSUB 9640
18060 RETURN
```

```
12120 R(I)=INT(RND(1)*10)+21
12130 NEXT I
12149 FOR I=4 TO 11
12150 R(I)=INT(RND(1)*10)+16
12160 NEXT I
12170 FOR I=12 TO 14
12180 R(I)=20
12190 NEXT I
12200 FOR I=15 TO 17
12210 R(I)=INT(RND(1)*5)+16
12220 NEXT I
12230 FOR I=18 TO 23
12240 R(I)=INT(RND(1)*5)+11
12250 NEXT I
12260 R(24)=INT(RND(1)*22)+11
12270 RETURN
12300 REM MATRIX OF MIDFIELD POSS.
12310 FOR I=1 TO 3
12320 FOR J=1 TO 3
12330 T4(I,J)=10
12340 NEXT J
12350 NEXT I
12360 T4(1,1)=5
12370 T4(3,3)=15
12380 REM MATRIX OF FREEKICKS TACTICS
12390 FOR I=1 TO 3
12400 FOR J=1 TO 3
12410 READ T1(I,J)
12420 NEXT J
12430 NEXT I
12440 REM MATRIX OF CORNER TACTICS
12450 FOR I=1 TO 3
12460 FOR J=1 TO 3
12470 READ T2(I,J)
12480 NEXT J
12490 NEXT I
12500 REM MATRIX OF ATTACK TACTICS
12510 FOR I=1 TO 3
12520 FOR J=1 TO 3
12530 READ T3(I,J)
12550 NEXT J
12560 NEXT I
12570 REM GENERATE OPPOSITION DEFAULT NAMES
12580 FOR I=1 TO 12
12590 Z9$ (I)=" NO. "+STR$(I)
12600 NEXT I
```



TROLLS GOLD

A KING'S ransom in gold could be yours if you are willing to brave the terrors of a deep dark cave. But reaching the gold is only half the battle — there is a particularly nasty Troll guarding the gold. He will attempt to stop you taking his golden treasure out of the cavernous labyrinth — that's if he hasn't got to you as you find you way into his lair. There are 36 rooms within the cave where the Troll can lurk or where the gold may be found. Can you beat the Troll in this battle of wits?

RUNS ON AN APPLE IN 3K

BY GEORGE BLANK



```
5  DIM A(110)
6  TEXT
7  HOME
10  REM  * TROLLS GOLD *
30  GOSUB 6000
50 G = 0:P = 1:T = 36
60  HOME
80  GOSUB 2000
90  GOTO 1000
100  REM  * DRAW GRID *
110  GR : COLOR= 15: HLIN 4,36 AT
     0
120  FOR I = 6 TO 36 STEP 6: HLIN
     1,36 AT I: NEXT I
130  FOR I = 1 TO 37 STEP 6: VLIN
     0,36 AT I: NEXT
290  COLOR= 5: PLOT 2,2: PLOT 2,3
     : PLOT 3,3: PLOT 3,4: PLOT 4
     ,4: PLOT 4,5: PLOT 5,5
320  COLOR= 13: HLIN 32,34 AT 35:
     PLOT 33,34
410  GOSUB 5000
420  GOSUB 5200
490  RETURN
1000  REM  * MASTER ROUTINE *
1010  IF  SCRN( 2,2) < > 5 THEN
      GOSUB 100
1020  GOSUB 2700
1100  GOSUB 5300
1200  GOSUB 3300
1910  GOSUB 2800
1990  GOTO 1000
2000  REM  * DOORS *
2010  FOR A = 1 TO 110
2020 A(A) = 0
2030  NEXT
2040  FOR A = 7 TO 36
2050 A(A) = 1
2060  NEXT
2070  FOR A = 52 TO 56
2080 A(A) = 1
2090 A(A + 6) = 1
2100 A(A + 12) = 1
2110 A(A + 18) = 1
2120 A(A + 24) = 1
2130 A(A + 30) = 1
2140  NEXT
2150  RETURN
2200  REM  * Y COORD OF DOOR * IN
      . D * OUT. Y *
2210  IF D > 49 THEN 2280
2220  IF D < 13 THEN Y = 6: GOTO
      2390
2230  IF D < 19 THEN Y = 12: GOTO
      2390
2240  IF D < 25 THEN Y = 18: GOTO
      2390
2250  IF D < 31 THEN Y = 24: GOTO
      2390
2260  IF D > 36 THEN Y = 36: GOTO
      2390
```



```
2270 Y = 30: GOTO 2390
2280  IF D < 57 THEN Y = 5: GOTO
     2390
2290  IF D < 63 THEN Y = 11: GOTO
     2390
2300  IF D < 69 THEN Y = 17: GOTO
     2390
2310  IF D < 75 THEN Y = 23: GOTO
     2390
2320  IF D < 81 THEN Y = 29: GOTO
     2390
2330 Y = 35
2390  RETURN
2400  REM  * X COORD OF DOOR * IN
     . D * OUT. X *
2410 Z = D
2420  IF Z > 49 THEN 2530
2430 Z = Z - 6
2440  IF Z > 6 THEN 2430
2450 Z =  INT (Z + .2)
2460  IF Z = 1 THEN X = 4
2470  IF Z = 2 THEN X = 10
2480  IF Z = 3 THEN X = 16
2490  IF Z = 4 THEN X = 22
2500  IF Z = 5 THEN X = 28
2510  IF Z = 6 THEN X = 34
2520  GOTO 2590
2530 Z = D - 44
2540 Z = Z - 6
2550  IF Z > 6 THEN 2540
2555 Z =  INT (Z +.2)
2560  IF Z = 2 THEN X = 7
2565  IF Z = 3 THEN X = 13
2570  IF Z = 4 THEN X = 19
2575  IF Z = 5 THEN X = 25
2580  IF Z = 6 THEN X = 31
2590  RETURN
2600  REM  * SELECT DOORS *
2610 D =  INT (( RND (1) * 80) +
     7)
2620  IF A(D) < > 1 THEN 2610
2630 A(D) = 2
2640  GOSUB 2200
2650  GOSUB 2400
2690  RETURN
2700  REM  * WHICH DOORS ARE OPEN
     ? *
2710  FOR B = 90 TO 110
2720  GOSUB 2600
2730 A(B) = D
2740  COLOR= 0: PLOT X,Y
2750  IF D >40 THEN  PLOT X,Y -
     1
2760  NEXT B
2770  HOME
2790  RETURN
2800  REM  * CLOSE DOORS *
2810  FOR A = 90 TO 110
2820 D = A(A)
2830 A(A) = 0
2840 A(D) = 1
2850  GOSUB 2200
2860  GOSUB 2400
2862  COLOR= 15
2865  IF D > 40 THEN 2880
2870  COLOR= 15: HLIN X - 1,X + 1
     AT Y
2875  GOTO 2890
2880  VLIN Y,Y - 1 AT X
2890  NEXT A
2895  RETURN
3000  REM  *LOCATE TROLL *
3010 D = T + 6
3020  GOSUB 2200
3030  GOSUB 2400
3040 X = X + 3
3050 Y = Y - 3
3060  RETURN
3100  REM  * RESET TROLL *
3110  COLOR= 0: PLOT X - 3,Y
3190  RETURN
3200  REM  * SET TROLL *
3210  COLOR= 9: PLOT X - 3,Y
3290  RETURN
3300  REM  * CONTROL TROLL *
3310  GOSUB 3000
3320  GOSUB 3100
3330 C = T - P
3340  IF C < 0 THEN 3370
3360  GOTO 3400
3370 C =  ABS (C)
3380  IF C < 6 THEN 3600
3390  GOTO 3700
3400  REM  * MOVE TROLL UP *
3410  IF T < 7 THEN 3500
3420  IF A(T) = 2 THEN T = T - 6
3430  IF T = P THEN 4000
3500  REM  * MOVE TROLL OUT *
3510  IF T = 1 THEN 3600
3520  IF A(T + 50) = 2 THEN T = T
     - 1
3530  IF T = P THEN 4000
3540  IF A(T) = 2 THEN T = T - 6
3550  GOTO 3800
3600  REM  * MOVE TROLL IN *
3610  IF A(T + 51) = 2 THEN T = T
     + 1: GOTO 3730
3700  REM  *MOVE TROLL DOWN *
3710  IF T > 30 THEN 3800
3730  IF T = P THEN 4000
3740  IF A(T + 6) = 2 THEN T = T +
     6
3800  REM  * END TROLL TURN *
3810  IF T = P THEN 4000
3820  GOSUB 3000
3830  GOSUB 3200
3890  RETURN
4000  REM  * EATEN BY TROLL *
4001  FOR I = 1 TO 10: PRINT  CHR$
     (7): NEXT : GOSUB 3000
```

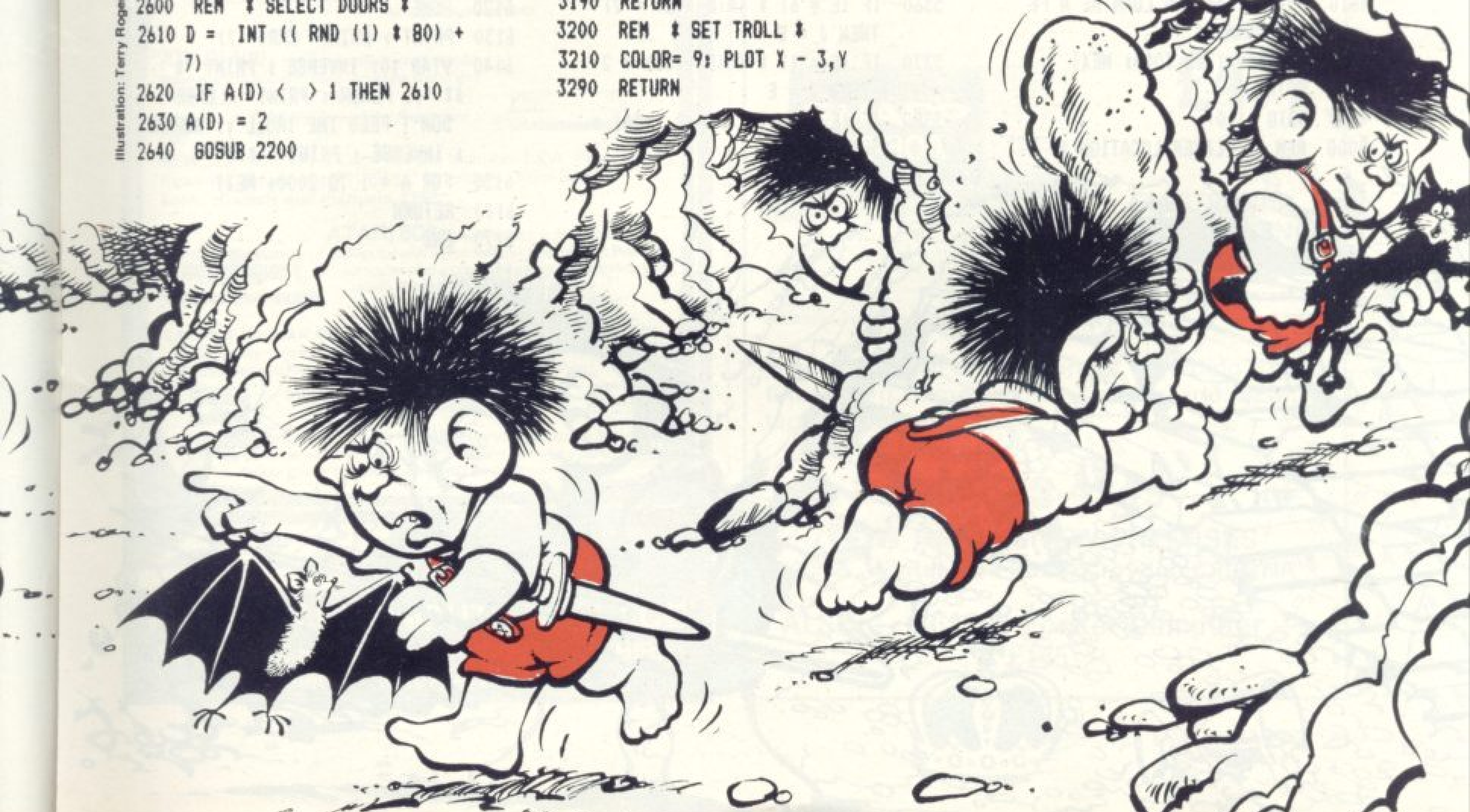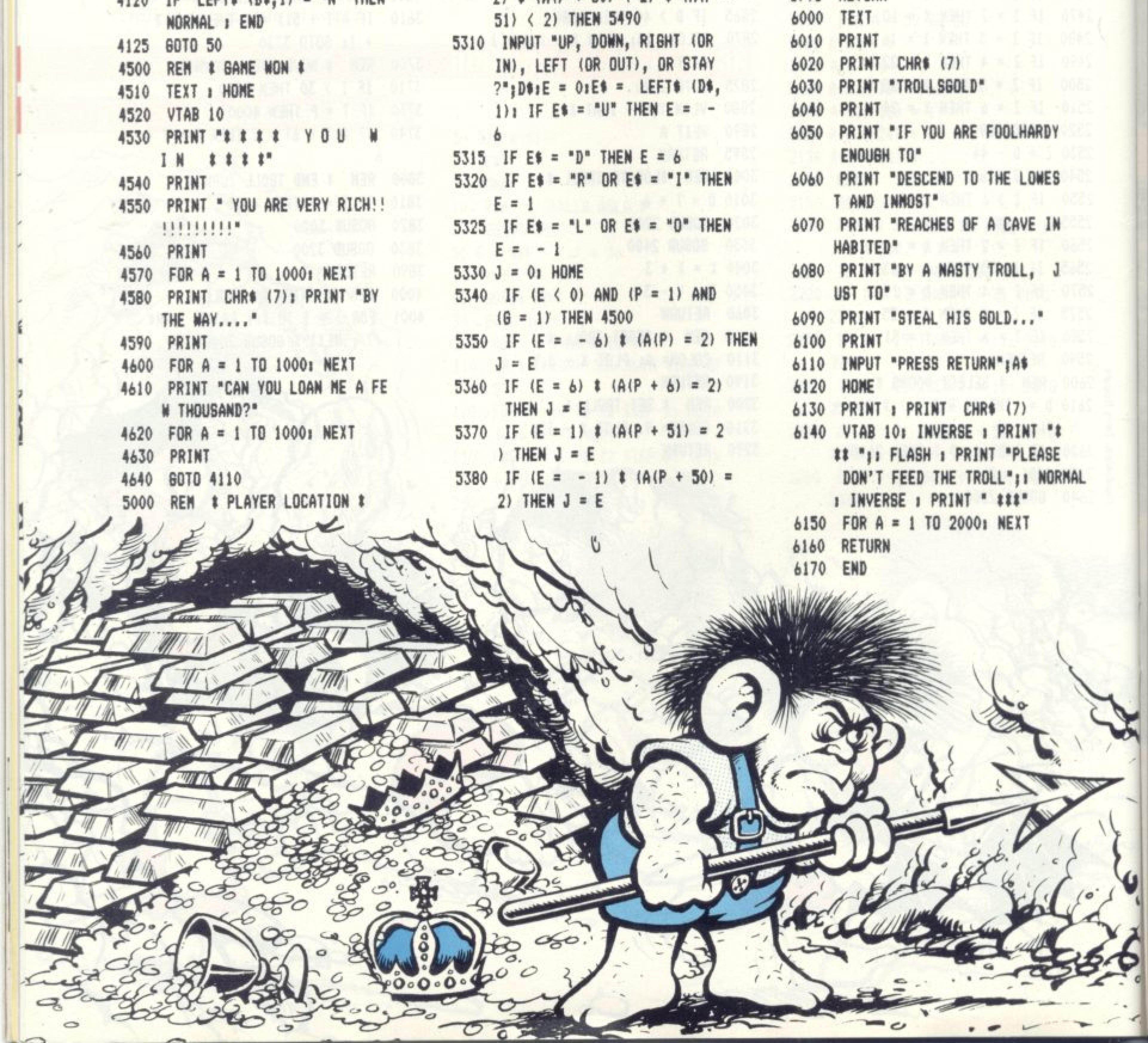


Illustration: Terry Rogers

```
4002  GOSUB 3200
4003  FOR I = 1 TO 1000: NEXT
4005  TEXT : HOME : VTAB 10
4010  TEXT : VTAB 10: INVERSE : FLASH
    : PRINT "SOME PEOPLE NEVER L
    EARN!!"
4030  NORMAL : PRINT
4040  PRINT "THE SIGN AT THE ENTR
    ANCE TO THE CAVE SAID:"
4050  INVERSE : PRINT "$    PLEASE
    DON'T FEED THE TROLL   $": NORMAL
4060  PRINT
4070  PRINT "THE TROLL JUST ATE Y
    OU FOR DINNER!"
4080  PRINT
4090  PRINT "  $ $ $  Y O U  L D
    S E !   $ $ $"
4100  PRINT
4110  INPUT "WOULD YOU LIKE TO TR
    Y AGAIN?";B$
4120  IF  LEFT$ (B$,1) = "N" THEN
    NORMAL : END
4125  GOTO 50
4500  REM  $ GAME WON $
4510  TEXT : HOME
4520  VTAB 10
4530  PRINT "$ $ $ $   Y O U   W
    I N   $ $ $ $"
4540  PRINT
4550  PRINT " YOU ARE VERY RICH!!
    !!!!!!!!!"
4560  PRINT
4570  FOR A = 1 TO 1000: NEXT
4580  PRINT  CHR$ (7): PRINT "BY
    THE WAY...."
4590  PRINT
4600  FOR A = 1 TO 1000: NEXT
4610  PRINT "CAN YOU LOAN ME A FE
    W THOUSAND?"
4620  FOR A = 1 TO 1000: NEXT
4630  PRINT
4640  GOTO 4110
5000  REM  $ PLAYER LOCATION $
5010 D = P + 6
5020  GOSUB 2200
5030  GOSUB 2400
5040 X = X + 3
5050 Y = Y - 3
5090  RETURN
5100  REM  $ RESET PLAYER $
5110  COLOR= 0: PLOT X - 3,Y
5140  IF G = 1 THEN  COLOR= 0: HLIN
    X - 5,X - 2 AT Y + 2: HLIN X
    - 4,X - 3 AT Y + 1
5190  RETURN
5200  REM  $ SET PLAYER $
5210  COLOR= 12: PLOT X - 3,Y
5240  IF G = 1 THEN  COLOR= 13: HLIN
    X - 5,X - 3 AT Y + 2: PLOT X
    - 4,Y + 1
5290  RETURN
5300  REM  $ CONTROL PHASE $
5305  IF (A(P) < 2) $ (A(P + 6) <
    2) $ (A(P + 50) < 2) $ (A(P +
    51) < 2) THEN 5490
5310  INPUT "UP, DOWN, RIGHT (OR
    IN), LEFT (OR OUT), OR STAY
    ?";D$:E = 0:E$ =  LEFT$ (D$,
    1): IF E$ = "U" THEN E =  -
    6
5315  IF E$ = "D" THEN E = 6
5320  IF E$ = "R" OR E$ = "I" THEN
    E = 1
5325  IF E$ = "L" OR E$ = "O" THEN
    E =  - 1
5330 J = 0: HOME
5340  IF (E < 0) AND (P = 1) AND
    (G = 1) THEN 4500
5350  IF (E =  - 6) $ (A(P) = 2) THEN
    J = E
5360  IF (E = 6) $ (A(P + 6) = 2)
    THEN J = E
5370  IF (E = 1) $ (A(P + 51) = 2
    ) THEN J = E
5380  IF (E =  - 1) $ (A(P + 50) =
    2) THEN J = E
5390  IF J = 0 THEN 5490
5400  GOSUB 5000
5410  GOSUB 5100
5420 P = P + J
5430  IF P = 36 THEN 5500
5440  GOSUB 5000
5450  GOSUB 5200
5460  IF T= P THEN 4000
5470  GOTO 5300
5490  RETURN
5500  REM  $ TAKE GOLD $
5510  GOSUB 5000
5520 G = 1
5530  GOSUB 5200
5540  GOSUB 5700
5590  GOTO 5300
5700  REM  $ RESET GOLD $
5710  COLOR= 0: HLIN X - 5,X - 3 AT
    Y + 2: HLIN X - 4,X - 3 AT Y
    + 1
5795  RETURN
6000  TEXT
6010  PRINT
6020  PRINT  CHR$ (7)
6030  PRINT "TROLLSGOLD"
6040  PRINT
6050  PRINT "IF YOU ARE FOOLHARDY
    ENOUGH TO"
6060  PRINT "DESCEND TO THE LOWES
    T AND INMOST"
6070  PRINT "REACHES OF A CAVE IN
    HABITED"
6080  PRINT "BY A NASTY TROLL, J
    UST TO"
6090  PRINT "STEAL HIS GOLD..."
6100  PRINT
6110  INPUT "PRESS RETURN";A$
6120  HOME
6130  PRINT : PRINT  CHR$ (7)
6140  VTAB 10: INVERSE : PRINT "$
    $$ ";: FLASH : PRINT "PLEASE
    DON'T FEED THE TROLL";: NORMAL
    : INVERSE : PRINT " $$$"
6150  FOR A = 1 TO 2000: NEXT
6160  RETURN
6170  END
```



MICHAEL ORWIN'S ZX81 CASSETTES

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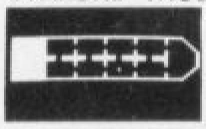
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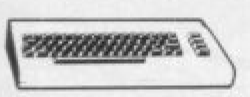
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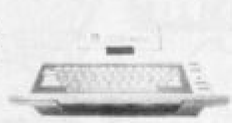
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COMPUTERS FOR PEOPLE



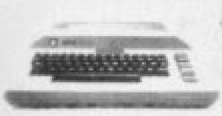
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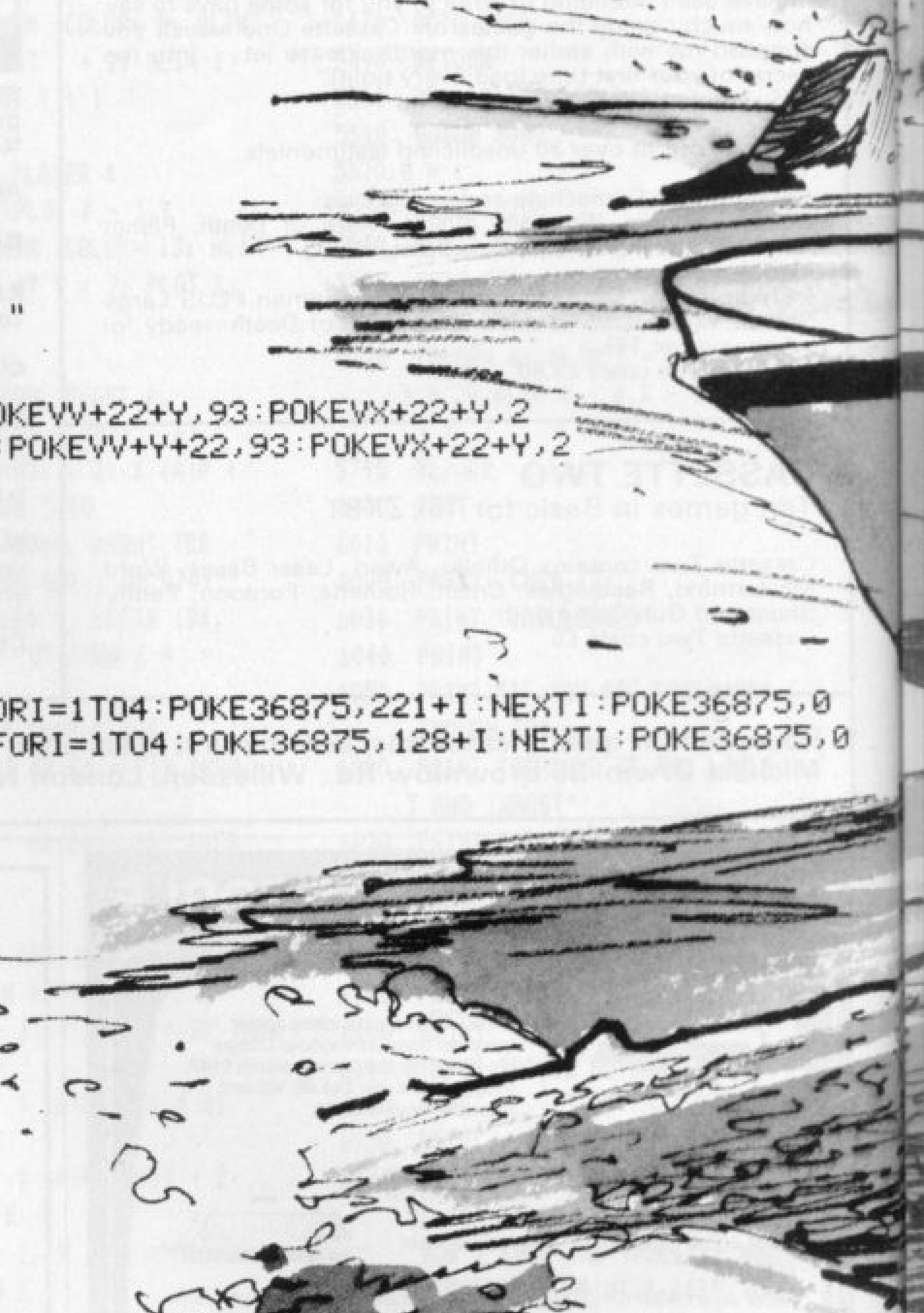
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```
0 MS=0:POKE36878,0:POKE36879,172
1 GOSUB5000
2 B=2:POKE36879,218:GOSUB7000
5 PRINT"♥"
10 PRINT"]":T=7:M=T+3:VV=0:S=0
20 FORI=1TO23
30 PRINTTAB(T)" ▌         ▀ "
40 NEXTI
50 X=INT(RND(1)*11)
55 Y=INT(RND(1)*23)
60 IFX<3THENT=T-1
70 IFX>7THENT=T+1
71 IFS>3500THEN GOSUB 9000:GOTO90
72 IFS>2500THENGOSUB8000:GOTO90
73 IFX=5THENPRINTTAB(T)" ▌   6  ▀ "
74 IFX=10THENPRINTTAB(T)" ▌    3  ▀ "
75 IF12<TTHENT=T-1
76 IF1>TTHENT=T+1
78 IFX=7 THENPRINTTAB(T)" ▌ ▓▓▓▓  ▀ "
80 VV=7680+(22*20)
81 VX=38400+(22*20)
82 IFY<TTHENPOKEVV+Y,81:POKEVX+Y,5:POKEVV+22+Y,93:POKEVX+22+Y,2
83 IFY>T+9THENPOKEVV+Y,81:POKEVX+Y,5:POKEVV+Y+22,93:POKEVX+22+Y,2
85 PRINTTAB(T)" ▌         ▀ "
90 GETA$
100 IFA$="Ж"THENM=M-1
110 IFA$="Ж"THENM=M+1
120 IFPEEK(M+7680)=101THEN300
130 IFPEEK(M+7680)=103THEN300
132 IFPEEK(M+7680)=102+128THEN300
135 IFPEEK(7680+M)=54+128THENS=S+6:FORI=1TO4:POKE36875,221+I:NEXTI:POKE36875,0
137 IFPEEK(7680+M)=51+128 THENS=S+3:FORI=1TO4:POKE36875,128+I:NEXTI:POKE36875,0
140 POKEM+7680,42
145 FORI=1TO2:POKE36874,200+I:NEXTI
150 S=S+3
160 GOTO50
300 POKE36874,0
305 FORI=228TO127STEP-1
310 POKE7680+M,170
320 POKE7680+M,163
330 POKE7680+M,205
340 POKE7680+M,206
350 POKE7680+M,42
355 POKE36877,I
360 NEXT
365 POKE36877,0
367 POKE36876,127
368 B=-1:GOSUB7000
369 POKE36879,26
370 PRINT"]IN SPEED BOAT----------"
380 PRINT"YOU SCORED------------"
390 PRINTS;"POINTS"
395 IFS>MS THENVV=0:MS=S:GOTO1000
397 GOTO1060
400 PRINT"ЖЖЖЖЖЖЖY/N TO PLAY AGAIN    "
410 FORI=1TO500:GETD$:IFD$="Ж"ORD$="Ж"THENNEXTI
420 IFD$="Y"THENB=1:POKE36879,218:GOSUB7000:PRINT"♥":GOTO10
425 IFD$="N"THENPRINT"]ЖЖЖЖЖЖЖЖЖЖЖЖЖBYE...BYE...":END
430 NEXTI
440 FORV=1TO50
450 PRINT"]                    "
460 PRINT"]ЖY/N TO PLAY AGAIN     "
470 NEXTV
480 PRINT"]ΙΙΙΙΙΙΙ"
490 GOTO400
1000 REM
1010 PRINT"ЖЖ":MS=S
1020 PRINT"YOU HAVE GOT THE HIGH"
1030 PRINT"SCORE FOR TODAY"
1040 PRINT"PLEASE INPUT YOUR NAME"
```

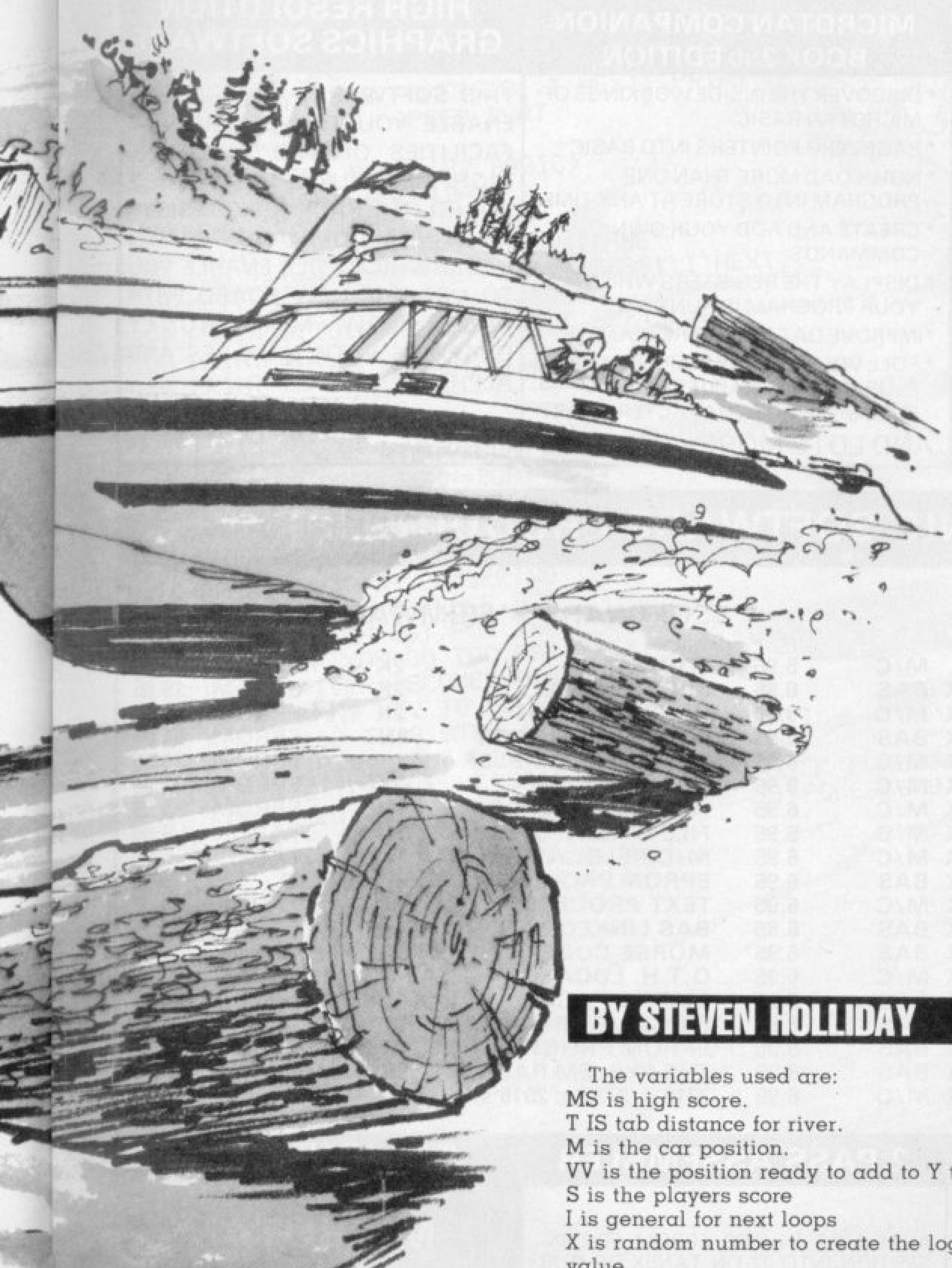
Trees

points scored

High Score



S·P·E·E·D·B·O·A·T



FINDING the source of the Mackenzie River by speedboat can be a real challenge in the logging season.

A lot of lumbering is going on and the thoughtless treefellers are sending their timber down river with little regard to life and limb.

The Mackenzie River follows the usual watery logic, being slow and sluggish at first but speeding up as you approach its source and after a score of 2,500 has been reached it narrows, becoming faster and more difficult for would-be discoverers to negotiate. Another 1,000 points and it is still more difficult.

A good boatsman will spot the most favourable currents and steer for them. These are shown as bonus points on the river.

The game is simple but it will suit the dexterous and those who can look ahead. It is for one person to steer the boat up-river, trying to miss the logs and hit the bonus scores as they flash upon the screen. To steer the boat use the two cursor keys for left and right.

The program runs as fast as it does because the river is printed onto the screen in a fast working statement and as the boat is poked onto the very top of the screen, each print statement pushes it totally off the screen, so only one poke statement is needed.

A graphically exciting and neatly playable game, difficult enough to become addictive.

BY STEVEN HOLLIDAY

The variables used are:
MS is high score.
T IS tab distance for river.
M is the car position.
VV is the position ready to add to Y to create the trees.
S is the players score
I is general for next loops
X is random number to create the logs' numbers and tab value
Y is position of trees
VX is colour position from trees.
A$ is boat movement.
D$ is Y/N to play again variable.
AE$ is the name of the person with the high score.
T$ general get statement variable.
V is volume controller.
S2 is sound generator.

RUNS ON A VIC-20 IN 3K

50-160 is main body of program.
7000-8000 is music routine.
5000-6000 the instructions.
8000-9000 is the medium width river.
9000- is thin river.
6000-7000 is data for music.
1000-2000 is high score routine.
160-1000 prints score and asks if another go is required.
82&83 makes the trees grow.
120-137 checks next position of craft.

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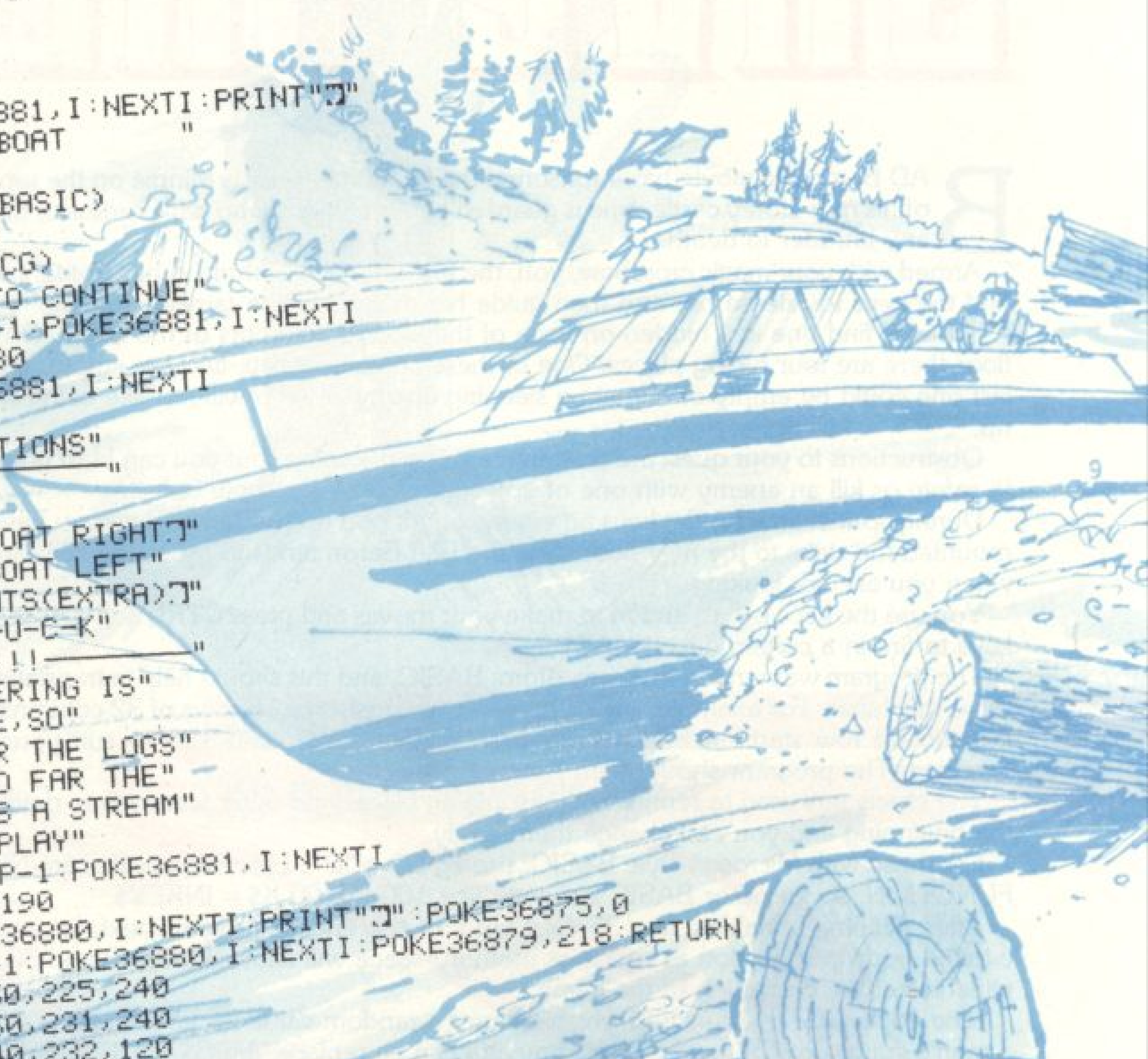
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```
1050 INPUTAE$
1060 PRINTAE$;" HAS THE HIGH SCORE"
1070 PRINT"WITH";MS;"POINTS"
1080 GOTO400
3025 S=S+3
3095 POKE36875,0
5000 FORI=38 TO180:POKE36881,I:NEXTI:PRINT"■"
5010 PRINT"■■        SPEED BOAT      "
5020 PRINT"■■■■"
5030 REM  SPEED BOAT (V2 BASIC)
5040 REM  BY S,L,HOLLIDAY
5050 REM  28/1/1982(FORV&CG)
5060 PRINT"■■■■■ANY KEY TO CONTINUE"
5070 FOR I=180 TO38 STEP-1:POKE36881,I:NEXTI
5080 GETT$:IFT$=""THEN5080
5090 FORI=38 TO180:POKE36881,I:NEXTI
5100 PRINT"■■"
5110 PRINT"  THE INSTRUCTIONS"
5120 PRINT"  ________________"
5130 PRINT"■"
5140 PRINT" CRSR RIGHT=BOAT RIGHT■"
5150 PRINT"■ CRSR DOWN=BOAT LEFT"
5160 PRINT" NUMBERS=POINTS(EXTRA)■"
5170 PRINT" ■ G-O-O-D L-U-C-K"
5171 PRINT"■——BEWARE!!!——"
5172 PRINT"ALOT OF LUMBERING IS"
5173 PRINT"TAKIING PLACE,SO"
5174 PRINT"WATCH OUT FOR THE LOGS"
5175 PRINT"IF YOU GO TOO FAR THE"
5176 PRINT"RIVER BECOMES A STREAM"
5180 PRINT"■ANY KEY TO PLAY"
5185 FOR I=180 TO38 STEP-1:POKE36881,I:NEXTI
5190 GETT$:IFT$=""THEN5190
5200 FORI=12 TO100:POKE36880,I:NEXTI:PRINT"■":POKE36875,0
5210 FORI=100TO12 STEP-1:POKE36880,I:NEXTI:POKE36879,218:RETURN
6000 DATA225,360,225,360,225,240
6010 DATA228,120,231,360,231,240
6020 DATA228,120,231,240,232,120
6030 DATA235,720,240,360,235,360
6040 DATA231,360,225,360,235,240
6050 DATA232,120,231,240,228,120
6060 DATA225,480
6070 DATA -1
6080 DATA 195,800,0,80,195,600,0,80,195,200,195,800,0,80
6090 DATA203,600,201,200,0,80,201,600,195,200,0,80
6100 DATA195,600,0,80,195,200,0,80,195,1000,-1
7000 S2=36875
7001 IFB>0THENRESTORE
7010 V=36878
7020 REM
7030 POKEV,15
7040 READP
7050 IFP=-1THENB=-1:RETURN
7060 READD
7070 POKES2,P
7080 FORN=1TOD :NEXTN
7090 POKES2,0
7100 FORN=1TO20:NEXTN
7120 GOTO7040
8000 IF14<TTHENT=T-1
8010 IF1>TTHENT=T+1
8020 PRINTTAB(T)" ■   ■ ":S=S+6
8030 RETURN
9000 IF18<TTHENT=T-1
9001 IF1>TTHENT=T+1
9005 PRINTTAB(T)" ■  ■ ":S=S+12
9010 RETURN
```



SAVE THE PRI

BAD Baron Megabyte has imprisoned the beautiful Princess Minnie on the top floor of his nine storey castle. She is guarded by his minions who have orders to trample any intruder to death.

Armed with your magic crossbow, you, the brave knight Gothur Lothur Bottul, have to find the keys to release her and then guide her to safety for a fairytale ending.

You will find one key hidden on each of the lower nine floors of the castle. On each floor there are four hiding places. One of these contains a key, two are empty, and the last one could be empty or contain a sleeping enemy — who will not like being woken up.

Obstructions to your quest are scattered around the castle, but you can blast your way to safety or kill an enemy with one of your nine magic crossbow bolts.

During your search for the keys an enemy might pop up suddenly when you have just mounted the stairs to the next floor. And the Bad Baron tends to move the keys around when you are not looking.

You use the keys I, J, L, and M to make your moves and press CTRL and one of those keys to fire in a certain direction.

The program was written in Acorn Atom, BASIC, and this should help in translating for other machines. For example, the Atom's screen consists of 16 rows of 32 columns, and the second row starts at 8020, so change lines 15, 121, and 125 to suit your own machine. The program should then run.

The characters used to represent stairs, hiding places and other features are defined at the beginning and you can change them easily.

For those with Microsoft-style BASIC, use eg D$ ="D". Line 30 provides an INKEY$ FUNCTION, so for other BASIC's change line 100 to 100 K$= INKEY$.

After defining variables, line 35 GOSUB's to the end of program text, so you can expand your introduction as much as memory space will allow. Lines 40 and 50 reset variables at the beginning of the game.

Line 40 starts with a function which ensures a random value for an address within the screen's limits. Line 50 uses a byte array and can be replaced by G$="0123456789".

New floors start at line 60 with a bleep and one second wait, followed by a row of information written to the top line of the screen. Line 65 POKE's obstructions are the random locations.

Lines 75 and 80 place the hides on the screen. Line 82 puts a key in one of them and gives a 1 in 4 chance of an enemy sleeping in one of the other hides. The array EE allows this extra one.

Line 85 and 87 invert the floor numbers where you have found keys, and also puts your player onto the screen.

Lines 110-115 convert the up-down-left-right choice to a screen address increment. Line 130 checks to see if a move would go off the screen. Line 145 reads the "fire" button so the same information is available to set direction of fire.

Before making a move the program looks at what is already there. If it is a hide a "W" character replaces an "H" character. If it is a key line 195 does a computed GOTO on an integer division on the floor number by nine. The program then branches to line 100 for all floors except nine, when it branches to line 3000.

By changing an enemy's character from "H" to "E" for hide characters you will have to step aside to avoid being trampled if you find an enemy.

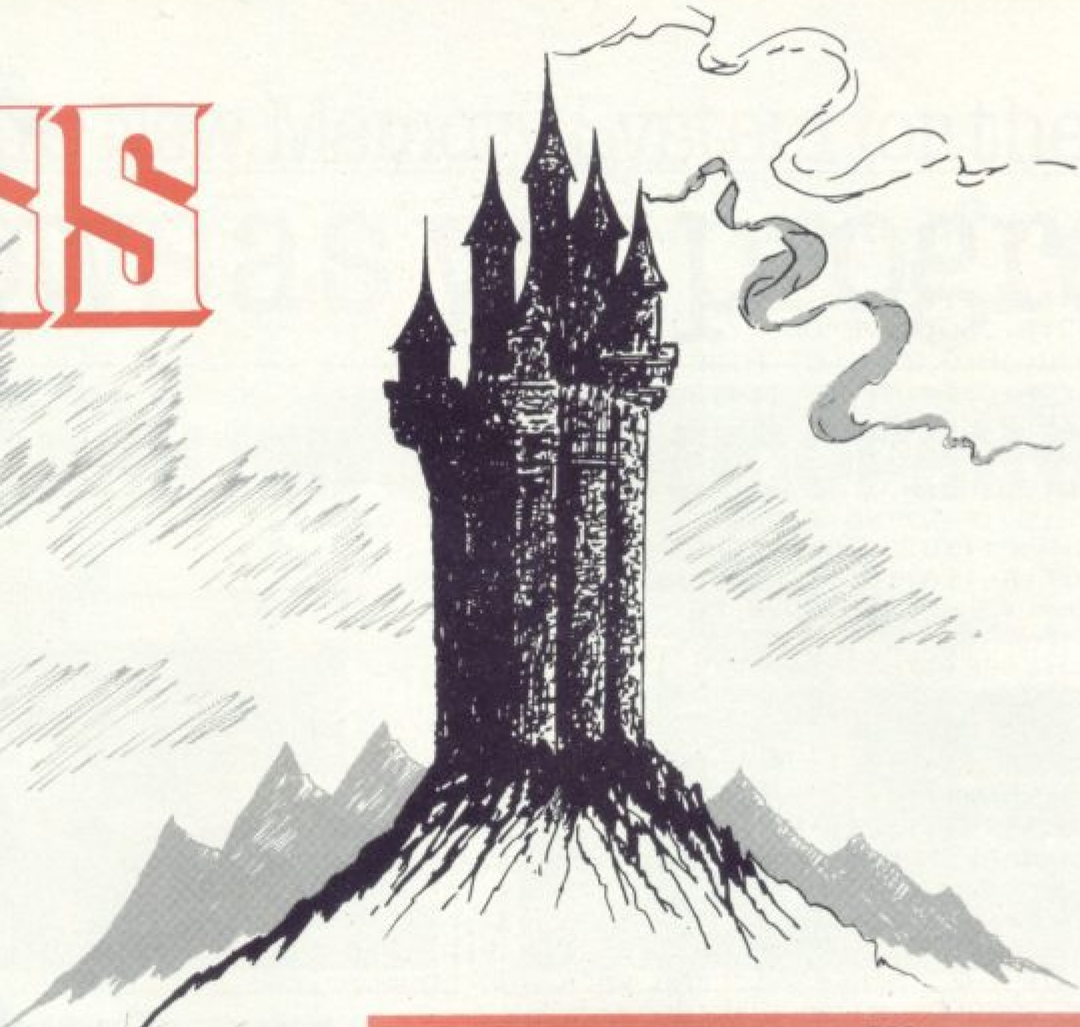
The enemy move is made in lines 300 to 350. To make the lower floors easier on your way up the number of enemy is kept constant — line 310. But the enemy move is only made if the character at the specified address is "E". The routine only moves them up and down the screen but it is possible to make them move sideways.

If the enemy does get you your remains are marked with a cross in line 340.

Program variables: A own position. B bolts. C change of address. D Cown stair character. E enemy character. EE9 enemy address. F floor number. G9 byte array, 0?9 if not got key. H hiding place character. HH3 hiding place address. I loop variable. K key pressed number. KKO lable for assembly code. L key character on screen. M Mecharacter (0=dead). N address of speaker. O obstruction character. P Princess rescued. Q quickest time. R random choice. S start of second row of screen. T time taken. U upstair character. V enemy killed. W3 what's in the hide. Y previous best number of kills. Z last address of screen.



NCESS





RUNS ON AN ATOM IN 3K

BY GEORGE TAYLOR

```
10 D=#84;E=#2A;H=#88;L=#8B;M=#F;N=#B002
11 REM DOWNSTAIR,ENEMY,HIDING,KEY,ME,L/SPEAKER
15 O=#FF;Q=9999;S=#8020;U=#95;Y=0;Z=#81FF
16 REM OBSTRUCTION,SCREEN 2ND LINE,SCREEN END
20 DIM EE(10),G9,HH(3),KK0,W3
21 REM KEYS GOT,ADDRESS OF HIDES,ASSEMBLER LABEL
22 REM CONTENTS OF HIDES,ASSEMBLER ADDRESS
30 DIM P-1;P.$21;[;:KK0 JSR #FE71:STY #80;RTS:];P.$6
31 REM INKEY$ SUB
35 T=0;V=0;GOS.5000:REM INSTRUCTIONS
40 A=S+A.R.%(Z-S):B=9;F=0;P=0;REM NEW GAME
41 REM ME POSITION,BOLTS,FLOOR,NO P/CESS
50 F.I=0TO9:G?I=I+48;N.I;G.62:NO KEYS YET
59 REM START NEW FLOOR AT 60,NEW MOVE AT 100
60 P.$7;F.I=1TO60:WAIT;N.I
62 P.$12"KEYS                BOLTS     FLOOR ";?(S-9)=B+48
65 F.I=1TO5*F+15;S?(A.R.%(Z-S))=O;N.I;REM OBSTRUCIONS
70 F.I=0TO10;EE(I)=S+A.R.%(Z-S);N.I;REM ENEMY POS.
72 F.I=0TO F;?EE(I)=E;N.I;REM PLACE ENEMY
75 F.I=1TO2;S?(A.R.%(Z-S))=D;S?(A.R.%(Z-S))=U;N.I
76 REM PLACE STAIRS
80 F.I=0TO3:HH(I)=S+A.R.%(Z-S);?HH(I)=H;N.I;REM HIDE
82 F.I=0TO3:W?I=32;N.I;W?(A.R.%4)=E;W?(A.R.%4)=L
83 REM ENEMY, KEY HIDDEN
85 ?A=M:?(S-1)=48+F;F.I=0TO9;S?(I-27)=G?I;N.I
86 REM KEYS GOT ON SCREEN
87 ?(S-1)=G?F;P.$7;REM INVERT FLOOR NO.
100 LINK KK0;K=?#80;REM SCAN KEYBOARD
110 IF K>40;IF K<46;GOS.(80+K);G.130
120 G.300
121 C=-32;R.
```

```
122 C=-1;R.
123 C=0;R.
124 C=1;R.
125 C=32;R.
130 IF A+C>=S;IF A+C<=Z;G.145; STAY ON SCREEN
145 G.300
145 IF ?#B001&64=0;G.4000;FIRE
150 IF A?C=32;G.250;MOVE OK
160 I=0;IF A?C<>H;G.200;NOT HIDE
170 IF HH(I)<>A+C;I=I+1;IF I<4;G.170;REM ADDRESS?
180 A?C=W?I;IF A?C=E;P.$7$7;EE(F+1)=A+C;G.100
185 REM ENEMY HIDING
190 IF A?C<>L;G.200;NOT KEY
195 G?F=F+176;S?(F-27)=G?F;?(S-1)=G?F;G.(100+F/9*2900)
200 IF A?C=U;F=F+1;G.2000;UP ONE FLOOR
210 IF A?C=D:F=F-1;G.1000:DOWN ONE
270 ?A=32;A=A+C:?A=M;REM MOVE ME
300 REM MOVE ENEMY
310 F.I=0TO10:C=EE(I)+32*(A>EE(I))-32*(A<EE(I))
312 IF C<S;G.330
315 IF C>Z;G.330:KEEP ON SCREEN
320 IF A=C;IF?EE(I)=E;P.$30$7'"SPLAT-YOURE DEAD"';M=0
325 IF?C=32;IF?EE(I)=E;?C=E;EE(I)=32;EE(I)=C
330 N.I;?N=?N:4;T=T+1;REM MOVE ONE ROW, CLICK
340 IF M=0;?A=#AB;LINK #FE94;G.35;MARK GRAVE
350 G.100
1000 IF F>0;G.60;DOWN STAIR
1010 P.$12"YOU ARE OUT OF THE CASTLE"';IF P;G.1030
1020 P."WITHOUT THE PRINCESS!"'"GO BACK YOU COWARD";F=0;G.60
1030 P."IN"T" SECONDS WITH "V"KILLS"
1040 P."BEST IS"Q"AND"Y;IF T<Q;T=Q;Y=V
1050 P."WELL DONE THOU BRAVE KNIGHT!";LINK #FE94;G.35
2000 IF F<10;G.60;UP STAIR
2010 P.$12"YOU ARE ON THE ROOF!"'"WHO DO YOU THINK TOU ARE?"
2020 P.'"BATMAN?";F=9;G.60
3000 I=0;REM KEY HIDDEN
3010 IF G?I>128;IFI<9;I=I+1;G.3010
3020 IF I<9;P.$12$7"YOU MUST COLLECT ALL KEYS";G?9=H;G.60
3030 P.$12$7"THE PRINCESS";P=1;G.60
4000 B=B-1;I=0;IF B<0;G.100;FIRE BOLTS
4010 I=I+1;?N=?N:4;IF A?(I*C)=32;A?(I*C)=#2E;G.4010;DOTS
4020 I=0;IF A?(I*C)=E;V=V+1
4030 I=I+1;?N=?N:4;IF A?(I*C)=#2E;A?(I*C)=32;G.4030
4040 ?(S-9)=B+48;G.100
5000 P.$12''"SAVE THE PRINCESS"'"BY G.E.TAYLOR"''
5010 P."FORWARD   = I"'
5020 P."LEFT   = J       L = RIGHT"'
5030 P."BACKWARD   = M"'
5040 P."FIRE = CTRL"'
5050 P.$(D-32)$(-32)U" STAIRS  "$(O-32)" OBSTRUCTIONS"'
5060 P.$(M+32)" YOU  "$E" ENEMY"'
5070 P."PRESS RETURN";LINK #FE94;R.
```



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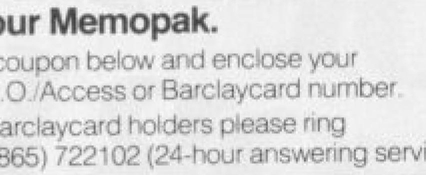
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BREAKDOWN OF MEMORY AREAS

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8–16K . . . This section of memory switches in or out in 4K blocks to leave space for memory mapping, holds its contents during cassette loads, allows communication between programmes, and can be used to run assembly language routines.

16–32K . . . This area can be used for basic programmes and assembly language routines.

32–64K . . . 32K of RAM memory for basic variables and large arrays.

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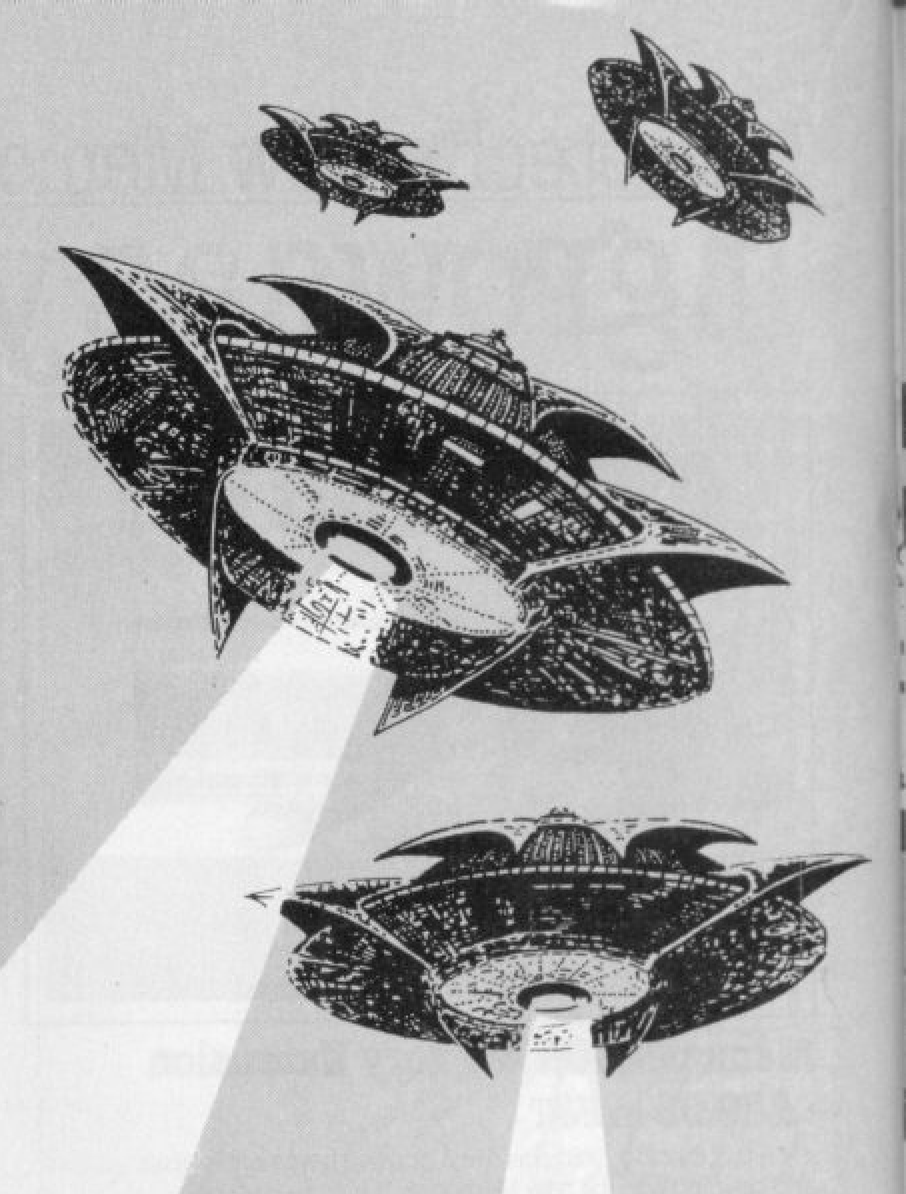
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sinclair selection

Computer and Video Games proudly presents two more exciting games for your Sinclair ZX81. Beat off an unearthly attack from the stars in War of the Worlds and win yourself a small fortune in Bet, a racecourse gambling game. We aim to cater for all kinds of Sinclair user — so we've chosen one IK epic and one 16K special for you to play. So keep your finger on the laser fire button and don't lose your shirt . . .



WAR OF THE WORLDS

Those nasty Martians are at it again. This time they are swooping from the sky to attack your laser base and smash it into the ground. You can fend them off by firing an invisible laser beam at them.

The laser base is printed at the bottom of the screen. You can move it left and right using the 'P' and 'A' keys.

The Martians appear at random positions on the screen and move down towards you. You must line up your base below them and use the '1' key to fire then. If they land on top of you the game will end.

If you manage to score 1000 the scoring rate will be doubled and the Martians will mutate into another form.

BY DAVID HEALEY

RUNS IN 1K

```
  10 LET A=PI/PI
  20 LET B=PI-PI
  30 LET C=15
  40 LET D=25
  50 LET S=B
  55 LET H=21
  60 LET E$=" ▛▚▜"
  70 LET G=A
  80 CLS
  90 LET X=INT (RND*26)
 100 LET Y=INT (RND*H)
 110 PRINT AT H,C;" ▄█▄ "
 115 IF Y>H THEN LET Y=H
 120 PRINT AT Y,X;E$
 124 IF Y=H AND X=C OR Y=H AND X
=C-A OR Y=H AND X=C+A THEN GOTO
600
 126 IF Y=H AND X=C+2 OR Y=H AND
X=C-2 THEN GOTO 600
 128 IF Y=H AND X<>C THEN GOTO 6
0
 130 IF INKEY$="A" THEN LET C=C-
A
 135 IF C<B THEN LET C=B
 140 IF INKEY$="P" THEN LET C=C+
A
 145 IF C>26 THEN LET C=26
 150 IF INKEY$="1" THEN GOTO 400
 170 LET Y=Y+G
 180 CLS
 190 GOTO 110
 400 IF C<>X THEN GOTO 170
 410 PRINT AT Y,X-A;" ▒ -*"
 420 PAUSE 4
 430 LET S=S+D
 440 IF S=1000 THEN GOTO 500
 450 GOTO 80
 500 LET E$="▝▙▟▘"
 510 LET D=D+D
 520 GOTO 80
 600 CLS
 610 PRINT "SCORE=";S
```

BET

BY JO GARNER

RUNS IN 16K

Forget the Grand National and the Derby — the ZX stakes is twice as exciting! You can win a fortune or lose your shirt — just like the real thing.

First you bet on the runners, numbered 1 to 5. You have £50 to bet.

When the betting is out of the way the ZX81 will display the race course with the runners at the top of the screen at the starting post. The horses are represented by the inverse graphics characters 1-5.

If you win your stake is multiplied by the number of the winning horse. If you lose the computer will subtract your stake from your total. Then you have the opportunity of betting again on another.

The variable M sets up the value of your money. The variables A to E set up the positions of the horses at the start of the race. If you want to be a coward and save your cash you can finish the game.

```
  10 REM "BET"
  11 PRINT "TO PLAY YOU STATE YO
UR STAKE      AND THE HORSE YOU BE
T IT ON.      IF YOU LOSE IT SUBTR
ACTS YOUR     STAKE FROM YOUR TOTA
L BUT IF      YOU WIN IT MULTIPLYS
 YOUR STAKE BY YOUR HORSE,ADDS 1
0 AND ADDS     ALL THAT TO YOUR TO
TAL           YOU MAY QUIT AFTER A
 RACE BY      PRESSING Q
              PRESS NEWLINE TO STA
RT"
  12 INPUT S$
  13 REM (C)J.GARNER 1981 TO C+V
G.
  20 LET M=50
  25 CLS
  30 LET A=5
  40 LET B=4
  50 LET C=3
  60 LET D=2
  70 LET E=1
  80 PRINT "HORSES 1,2,3,4,5 ARE
 RUNNING      HOW MUCH ARE YOU BET
TING?         MONEY=£";M
  90 INPUT N
 100 PRINT "***BET NOW***"
 110 INPUT H
 120 CLS
 121 PRINT AT 1,16;"MONEY BET=",
,N,,"MONEY LEFT=",,M-N,,"ON HORS
E",,H,,"LEADER="
 122 IF A>B AND A>C AND A>D AND
A>E THEN PRINT AT 7,23;"1"
 123 IF B>A AND B>C AND B>D AND
B>E THEN PRINT AT 7,23;"2"
 124 IF C>A AND C>B AND C>D AND
C>E THEN PRINT AT 7,23;"3"
 125 IF D>A AND D>B AND D>C AND
D>E THEN PRINT AT 7,23;"4"
 126 IF E>A AND E>B AND E>C AND
E>D THEN PRINT AT 7,23;"5"
 127 PRINT AT 0,0;"**********HOR
SE RACE**********"
 130 PRINT AT 19,0;"[graphics]"
 140 PRINT AT 20,0;"**FINISH**"
 150 PRINT AT A,1;"[illegible]"
 160 PRINT AT B,3;"[illegible]"
 170 PRINT AT C,5;"[illegible]"
 180 PRINT AT D,7;"[illegible]"
 190 PRINT AT E,9;"[illegible]"
 195 IF A=18 OR B=18 OR C=18 OR
D=18 OR E=18 THEN GOTO 400
 200 LET Z=INT (RND*5)+1
 210 IF Z=1 THEN LET A=A+1
 220 IF Z=2 THEN LET B=B+1
 230 IF Z=3 THEN LET C=C+1
 240 IF Z=4 THEN LET D=D+1
 250 IF Z=5 THEN LET E=E+1
 260 GOTO 122
 400 SCROLL
 401 PRINT "HORSE NO.";Z;" WON"
 402 SCROLL
 403 IF Z=H THEN GOTO 600
 405 SCROLL
 410 PRINT "**YOU LOSE**"
 420 SCROLL
 430 LET M=M-N
 431 IF M<=0 THEN PRINT "YOU ARE
[illegible]"
 432 IF M<=0 THEN GOTO 2290
 435 IF INKEY$="" THEN GOTO 435
 436 IF INKEY$="Q" THEN GOTO 200
0
 440 GOTO 25
 600 PRINT "[illegible]"
 610 LET M=M+(N*H+10)
 615 IF M>=1000000 THEN GOTO 700
 620 IF INKEY$="" THEN GOTO 620
 625 IF INKEY$="Q" THEN GOTO 200
0
 630 GOTO 25
 700 PAUSE 100
 705 CLS
 710 IF M>=1000000  THEN PRINT "
YOU NOW HAVE A MILLION QUID
[illegible]"
 720 GOTO 620
2000 CLS
2001 FOR N=1 TO M
2002 PRINT AT 21,25;"£";N
2010 SCROLL
2020 PRINT "[graphics]"
2030 SCROLL
2040 PRINT "[graphics]"
2050 SCROLL
2060 PRINT "[graphics]"
2070 SCROLL
2080 PRINT "[graphics]"
2090 SCROLL
2100 PRINT "[graphics]"
2101 SCROLL
2110 PRINT "[graphics]"
2120 SCROLL
2130 PRINT "[graphics]"
2140 SCROLL
2150 PRINT "[graphics]"
2160 SCROLL
2170 PRINT "[graphics]"
2180 NEXT N
2290 SCROLL
2295 PRINT "PRESS NEWLINE TO REP
EAT"
2300 INPUT A$
2305 CLS
2310 RUN
```



Helicopter Lander



RUNS ON A PET IN 8K

BY BARRY COOPER

AND ANDREW GREEN

Flying your helicopter over a rough North Sea you have to set down safely on an oil rig's pitching and rolling landing pad — and not crash into the sea.

You use the 4 key to move left, 6 to move right, 8 to go up and 2 to go down. The characters inside the string quotes in lines 100, 110, 120, 330, 340, 350, 430 and 500 should be typed in shift mode to produce the graphics used in this game.

The variables are: H and HD — height and position of helicopter. S — score. R — random position of launching pad.

```
10 REM ** HELICOPTER LANDER **
20 LET S=0
30 LET R=INT(RND(1)*20)+10
40 LET H=14
50 LET A$=""
60 LET B$=""
70 LET HD=1
80 PRINT"3 90 LETS=S+1
100 PRINT"";LEFT$(B$,HD-1);LEFT$(A$,H);"`2`"
110 PRINT"";LEFT$(B$,HD);LEFT$(A$,H);")2888"
120 PRINT"";LEFT$(B$,11);LEFT$(A$,R);"8888"
130 GOSUB 500
140 LET Z=INT(RND(1)*2)+1
150 ON Z GOSUB240,260
160 IF PEEK(151)=42 ANDH)2.THEN H=H-1
170 IF PEEK(151)=41 ANDH(36THEN H=H+1
180 IF PEEK(151)=18 THEN HD=HD+1
190 IF HD()10 THEN 80
200 IF H=R ORR=H-1 ORR=H-2 OR R=H-3  THEN 280
210 GOSUB320
220 GOTO 380
230 END
240 IF R) 3 THEN R=R-1
250 RETURN
260 IF R (38 THEN R=R+1
270 RETURN
280 GOSUB 320
290 PRINT"*SUCESS*"
300 PRINT"S;"MINUTES
310 GOTO 450
320 PRINT"3"
330 PRINT"";LEFT$(B$,HD-1);LEFT$(A$,H);"`2`"
340 PRINT"";LEFT$(B$,HD);LEFT$(A$,H);")2888"
350 PRINT"";LEFT$(B$,11);LEFT$(A$,R);"8888"
360 GOSUB 500
370 RETURN
380 REM
390 FOR N=1 TO 5:LET HD=11+N:GOSUB 320:NEXT N
400 PRINT"CRASHED"
410 PRINT"";LEFT$(B$,HD-1);LEFT$(A$,H);"    "
420 PRINT"";LEFT$(B$,HD);LEFT$(A$,H);"    "
430 PRINT"";LEFT$(B$,16);LEFT$(A$,H);"*1**1*"
440 POKE 158,0
450 PRINT" AGAIN ?"
460 GETA$:IF A$=""THEN 460
470 IF A$="Y" THEN RUN
480 IF A$="N" THEN END
490 GOTO 460
500 PRINT"";LEFT$(B$,12)"nmnmnmnmnmnmnmnmnmnmnmnmnmnmnmnmnmnmnmnm"
510 RETURN
READY.
```

DOG STAR ADVENTURE

RUNS ON A TRS-80

BY LANCE MICKLUS

The evil General Doom is holding Princess Leya, the leader of the Forces of Freedom, captive on his ship. He captured her ship — bound for a secret command centre on the planet Harris Seven. He has also captured her entire treasury of Melidium Crystals, the currency of the galaxy.

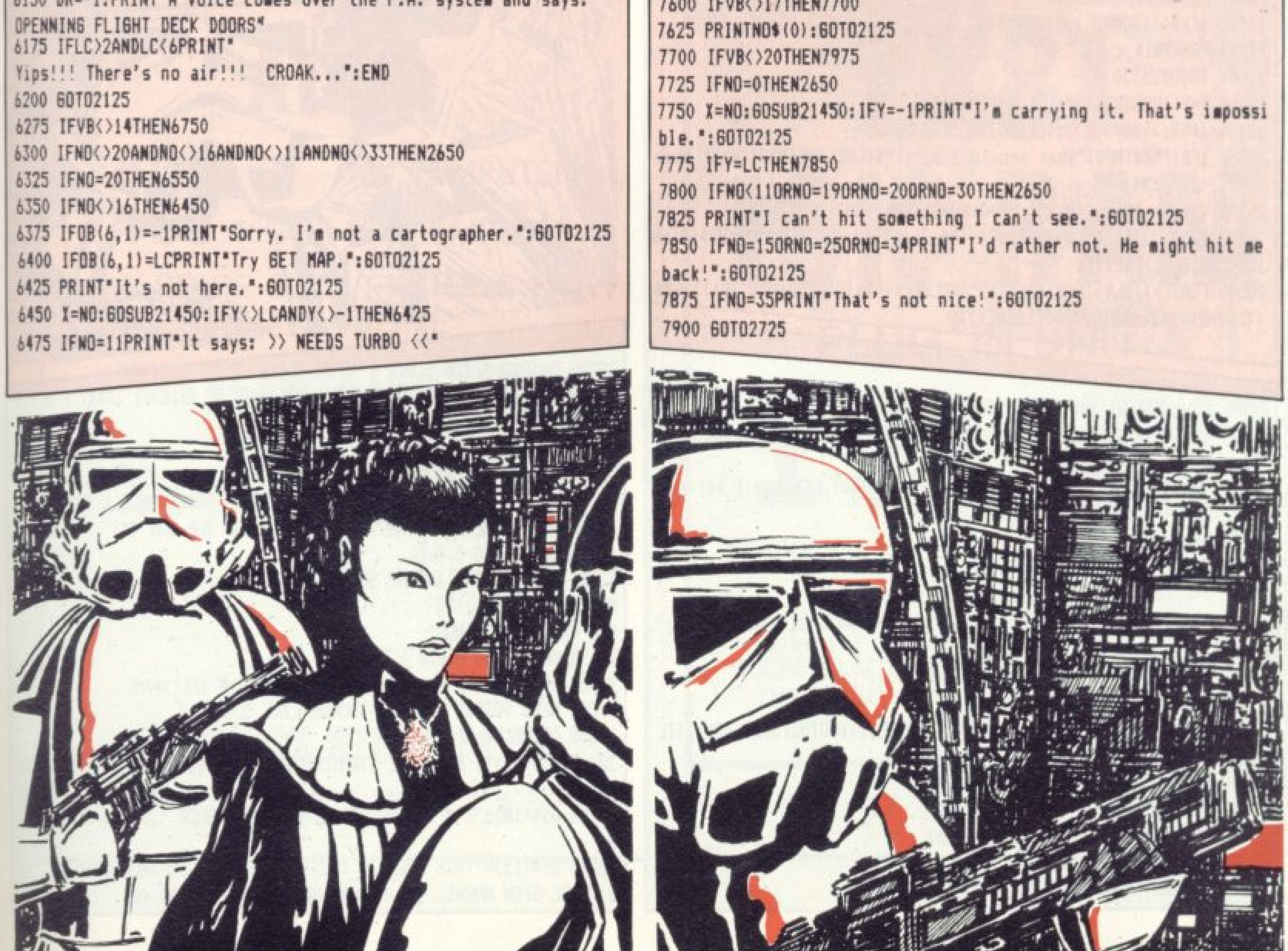
Princess Leya is wearing a Shinestone necklace. Encoded in one of the stones is the location and strength of her Freedom Fighting Force.

Through the medium of your computer you can roam the ship and attempt to rescue the Princess. Even if you do not manage the rescue you must try to disrupt Doom's plans for the galaxy. There are guards all over the ship and you could be easily caught and imprisoned.

The computer understands several ordinary English commands such as GET and DROP. Other words that you can use are HELP, INVEN, LOOK, and SCORE. There are more — but you must discover these yourself.

```
150 CLEAR200:RANDOM:DEFINTA-Z
200 GOSUB30300
450 LC=2:SL=64:BL=4:GF=50:RV=16396
600 GOTO10300
2125 IFTC<25ORRND(GF)<>1THEN2425
2150 IFTC=300LETGF=20
2175 IFLC<3ORLC=9ORLC=26ORLC=36ORLC=37THEN2425
2200 IFLC>26ANDLC<31THEN2425
2225 PRINT"Holy smokes. An armed guard just walked in."
2250 GOSUB20350:IFVB<>12ORNO<>15THEN5575
2275 X=13:GOSUB21450:IFY<>-1THEN5575
2300 IFBL=0CLS:PRINT"I'm out of ammunition.":PRINT:GOTO5600
2325 PRINT"zzZAP! No more guard."
2350 BL=BL-1:IFBL=0PRINT"I'm out of ammunition."
2425 IFMD<>TCTHEN2550
2450 X=22:GOSUB21450:IFY<>-1THEN2550
2475 PRINT"Your McDonald's Hamburger is cold."
2550 GOSUB20350:TC=TC+1
2575 IFVB=0ANDNO=0THEN2650ELSE2800
2650 PRINT"I don't know how to do that.":GOTO2125
2725 PRINT"Nothing happened.":GOTO2125
2800 IFVB>1ORNO>7THEN3175
2825 IFNO=0THEN2650
2850 IFDS(LC,NO-1)=0PRINT"I can't go that way!":GOTO2125
2875 IFDRANDDS(LC,NO-1)>2ANDDS(LC,NO-1)<6PRINT"I can't go that w
ay.  Flight deck doors are open.
NO AIR!!!":GOTO2125
2900 IFNO=3ANDLC=31ANDNOTDJPRINTMO$:GOTO2125
2925 IFLC=35ANDDS(LC,NO-1)=36ANDOB(21,0)<>0PRINT"The robot won't
 let me through.":GOTO2125
2950 IFLC=17ANDOB(13,1)=17THEN5575
2975 IFLC=9ANDOB(5,1)=9THEN5575
3000 IFLC=9ORLC=17LETHE$(LC)=""
3025 LC=DS(LC,NO-1)
3050 IFLC=34LETHE$(LC)=""
3075 IFLC=26THEN11800
3100 GOTO10300
3175 IFVB=36GOTO10300
3250 IFVB<>2THEN3700
3275 IFNO=0PRINT"I don't know what a ";CHR$(34);NO$(0);CHR$(34);
" is.":GOTO2125
3300 IFCR>5PRINT"I can't carry any more.
HINT: Drop something.":GOTO2125
3325 FORI=1TOLO:IFOB(I,0)=NOXTHEN3350ELSENEXTI:GOTO2650
3350 IFOB(I,1)=-1PRINT"I'm already carrying it.":GOTO2125
3375 IFOB(I,1)<>LCPRINT"I don't see it.":GOTO2125
3400 IFNO<>37THEN3475
3425 X=13:GOSUB21450:IFY<>-1PRINT"I don't have a blaster to put
it in.":GOTO2125
3450 BL=4:OB(I,1)=0:PRINT"My BLASTER's reloaded.":FORI=1TO1:NEXT
I:GOTO2125
3475 IFNO=15ORNO=25ORNO=34PRINT"He looks pretty mean to me.":GOT
O2125
3500 CR=CR+1:OB(I,1)=-1:PRINT"O.K.":FORI=1TO1:NEXTI
3525 IFNO=14ANDNOTCMPRINT"A voice says: ";CHR$(34);"SESAME";CHR$
(34);".":CM=-1
3550 IFNO=22ANDMD=0LETMD=TC+50
3575 IFNO=12LETHE$(2)=""
3600 IFNO=13LETHE$(7)=""
3625 GOTO2125
3700 IFVB<>4THEN3875
3725 PRINT"I'm carrying:"
3750 K=0:FORI=1TOLO:IFOB(I,1)=-1PRINTOB$(I):K=1
3775 NEXTI:IFK=0PRINT"NOTHING"
3800 PRINT:GOTO2125
3875 IFVB<>5THEN3950ELSEGOSUB21050:GOTO2125
3950 IFVB<>6THEN4200
3975 IFNO=0THEN3275
4000 IFLC=2PRINT"There's no room here.":GOTO2125
4025 IC=0:FORI=1TOLO:IFOB(I,1)=LCLETIC=IC+1
4050 NEXTI:IFIC>12PRINT"There not enough room. Get rid of someth
ing.":GOTO2125
4075 FORI=0TOLO:IFOB(I,0)=NOXTHEN4100ELSENEXTI:GOTO2650
4100 IFOB(I,1)<>-1PRINT"I'm not carrying it.":GOTO2125
4125 CR=CR-1:OB(I,1)=LC:PRINT"O.K.":FORI=1TO1:NEXTI:GOTO2125
4200 IFVB<>7THEN4300
4225 IFHE$(LC)=""THENPRINT"How am I supposed to know what to do?
":GOTO2125ELSEPRINTHE$(LC):GOTO2125
4300 IFVB<>8THEN4750
4375 IFNOTBTTHEN4475ELSEPRINT"Press (ENTER) when ready to : RECO
RD :"
4400 GOSUB22000:GOTO4525
4475 IFNO$(0)=""PRINT"Try something like ";CHR$(34);VB$(0);" fil
espec";CHR$(34);".":GOTO2125
4500 OPEN"O",1,NO$(0)
4525 FORI=0TOLO
4550 IFBTTHENPRINT#-1,OB(I,0),OB(I,1),OB(I,2)ELSEPRINT#1,OB(I,0)
;OB(I,1);OB(I,2)
4575 NEXTI
4600 IFBTPRINT#-1,TB,TC,CM:PRINT#-1,DR,BL,MD:PRINT#-1,GF,DJ,CR:P
RINT#-1,LC
4625 IFNOTBTPRINT#1,TB;TC;CM;DR;BL;MD;GF;DJ;CR;LC
4650 IFNOTBTCLOSE
4675 PRINT"O.K.":GOTO2125
4750 IFVB<>9THEN5150
4825 IFNOTBTTHEN4925ELSEPRINT"Press (ENTER) when ready to # READ
 TAPE #"
4850 GOSUB22000:GOTO4975
4925 IFNO$(0)=""THEN4475
4950 OPEN"I",1,NO$(0)
4975 FORI=0TOLO
5000 IFBTTHENINPUT#-1,OB(I,0),OB(I,1),OB(I,2)ELSEINPUT#1,OB(I,0)
,OB(I,1),OB(I,2)
5025 NEXTI
5050 IFBTINPUT#-1,TB,TC,CM:INPUT#-1,DR,BL,MD:INPUT#-1,GF,DJ,CR:I
NPUT#-1,LC
```

```
5075 IFNOTBTINPUT#1,TB,TC,CM,DR,BL,MD,GF,DJ,CR,LC
5100 IFNOTBTCLOSE
5125 GOTO10300
5150 IFVB<>10THEN5225ELSECLS:J=0:GOTO11200
5225 IFVB<>11THEN5725
5250 IFNO<>10THEN2650
5275 IFLC<>2ANDLC<>11PRINT"What button,":GOTO2125
5300 IFLC=11ANDNOTTBLETTB=-1:PRINTN2$:GOTO2125
5325 IFLC=11ANDTBLETTB=0:PRINTN3$:GOTO2125
5375 X=12:GOSUB21450:IFY<>1THEN2725
5425 X=24:GOSUB21450:IFY<>1THEN2725
5450 IFNOTTBPRINTN3$:GOTO2725
5475 IFNOTDRPRINTN4$:GOTO2725
5500 GOTO11150
5575 CLS:PRINT"H E L P ! ! !":PRINT
5600 PRINT"Roche Soldiers are everywhere. I've been captured."
5625 PRINT"I'm now a prisoner. Woe is me..."
5650 GOTO11500
5725 IFVB<>12ORNO=0THEN6025
5750 IFBL=0PRINT"But I don't have any ammunition left.":GOTO2125
5775 X=13:GOSUB21450:IFY<>-1PRINT"But I'm not carrying a BLASTER
.":GOTO2125
5800 X=NO:GOSUB21450:IFY=-1PRINT"I can't. I'm holding it.":GOTO2
125
5825 IFNO=34PRINT"zzZAP!":BL=BL-1:GOTO2125
5850 IFY<>LCPRINT"I don't see it.":GOTO2125
5875 FORI=1TOLO:IFOB(I,0)=NOXTHEN5900ELSENEXTI:GOTO2650
5900 OB(I,1)=0:FORI=1TO1:NEXTI:PRINT"zzZAP!!!  The ";NO$(NO);" v
aporized."
5925 BL=BL-1:IFBL=0PRINT"I'm out of ammunition."
5950 GOTO2125
6025 IFVB<>13THEN6275
6050 IFNO=0PRINT"Say what?":GOTO2125
6075 X=14:GOSUB21450
6100 IFY<>-1ORNO<>19PRINT"O.K.    ";NO$(NO):GOTO2125
6125 IFDRGOTO2725
6150 DR=-1:PRINT"A voice comes over the P.A. system and says:
OPENNING FLIGHT DECK DOORS"
6175 IFLC>2ANDLC<6PRINT"
Yips!!! There's no air!!!  CROAK...":END
6200 GOTO2125
6275 IFVB<>14THEN6750
6300 IFNO<>20ANDNO<>16ANDNO<>11ANDNO<>33THEN2650
6325 IFNO=20THEN6550
6350 IFNO<>16THEN6450
6375 IFOB(6,1)=-1PRINT"Sorry. I'm not a cartographer.":GOTO2125
6400 IFOB(6,1)=LCPRINT"Try GET MAP.":GOTO2125
6425 PRINT"It's not here.":GOTO2125
6450 X=NO:GOSUB21450:IFY<>LCANDY<>-1THEN6425
6475 IFNO=11PRINT"It says: >> NEEDS TURBO <<"
6500 IFNO=33PRINT"It says: >> OUT OF ORDER <<"
6525 GOTO2125
6550 IFLC<>13PRINT"I don't see any.":GOTO2125
6575 PRINT:PRINT"It says on the wall,"
6600 PRINT">> YOUR MOTHER'S GOT A BIG NOSE <<"
6625 PRINT">> KILROY MADE IT HERE, TOO <<"
6650 PRINT">> SAY SECURITY <<"
6675 GOTO2125
6750 IFVB<>15THEN6975
6775 IFNO=0PRINT"What's a ";NO$(0);"?":GOTO2125
6800 IFNO<>22PRINT"Don't be rediculous.":GOTO2125
6825 X=22:GOSUB21450:IFY<>-1PRINT"I'm not holding it.":GOTO2125
6850 FORI=1TOLO:IFOB(I,0)=22THEN6875ELSENEXTI:PRINT"I don't know
 where it is.":GOTO2125
6875 OB(I,1)=0:PRINT"Chump - Chump.  Hummm, good."
6900 FORI=1TO1:NEXTI:GOTO2125
6975 IFVB<>16ORNO<>23ORLC<>16THEN7125
7000 X=23:GOSUB21450:IFY<>-1PRINTM1$:GOTO2125
7025 OB(11,1)=0:OB(14,1)=16:CR=CR-1:PRINTM2$
7050 GOTO2125
7125 IFVB<>18ORNO<>36THEN7275
7150 IFNO<>36ORLC<>31THEN2650
7175 X=17:GOSUB21450:IFY<>-1PRINTM3$:GOTO2125
7200 HE$(31)="":DJ=-1:PRINTM4$:GOTO2125
7275 IFVB<>19ORNO=0THEN7600
7300 IFNO<>34PRINT"That's stupid!":GOTO2125
7325 IFLC<>35PRINTM5$:GOTO2125
7350 X=22:GOSUB21450:IFY<>-1PRINTM6$:GOTO2125
7375 IFNO=35PRINTM7$:GOTO2125
7400 IFNO<>34PRINTNO$(0);M8$:GOTO2125
7425 IFTC>MDPRINTM9$:GOTO2125
7450 FORI=1TOLO:IFOB(I,0)=34THEN7475ELSENEXTI:GOTO2650
7475 K=I:FORI=1TOLO:IFOB(I,0)=22THEN7500ELSENEXTI:GOTO2650
7500 PRINTNO$:HE$(35)=""
7525 OB(K,1)=0:OB(I,1)=0: OB(21,0)=0:OB$(21)="":
     FORI=1TO1:NEXTI:GOTO2125
7600 IFVB<>17THEN7700
7625 PRINTNO$(0):GOTO2125
7700 IFVB<>20THEN7975
7725 IFNO=0THEN2650
7750 X=NO:GOSUB21450:IFY=-1PRINT"I'm carrying it. That's impossi
ble.":GOTO2125
7775 IFY=LCTHEN7850
7800 IFNO<11ORNO=19ORNO=20ORNO=30THEN2650
7825 PRINT"I can't hit something I can't see.":GOTO2125
7850 IFNO=15ORNO=25ORNO=34PRINT"I'd rather not. He might hit me
 back!":GOTO2125
7875 IFNO=35PRINT"That's not nice!":GOTO2125
7900 GOTO2725
```



```
7975 IFVB<>21THEN8000ELSEPRINT"I'm not strong enough to kill any
thing.":GOTO2125
8000 GOTO2650
10300 CLS:PRINTDS$(LC):A$=""
10305 IFLC=35LETGF=10
10400 IFLC=7THEN10700
10450 K=0:FORI=1TOLO:IFOB(I,1)<>LCTHEN10600
10500 IFK=0LETK=1:PRINT:PRINT"Around me I see:":A$=OB$(I):GOTO10
600
10550 IFLEN(A$)+5+LEN(OB$(I))>SLTHENPRINTA$:LETA$=OB$(I)ELSEA$=A
$+"    "+OB$(I)
10600 NEXTI
10650 IFA$<>""PRINTA$
10700 PRINT:PRINT"Obvious directions are ";:K=0
10750 FORI=0TO5:IFDS(LC,I)=0THEN10900
10800 IFK<>0PRINT", ";
10850 PRINTNO$(I+1);:K=1
10900 NEXTI
10950 IFK=0PRINT"unknown";
11000 PRINT".":GOTO2125
11150 CLS:GOSUB21050
11200 IFJ=0PRINT"We have FAILED our mission.
The forces of Princess Leya will be conquered."
11250 IFJ=SCPRINT"We are HEROS.
The forces of Princess Leya will conquer the evil Roche
soldiers, and freedom will prevail throughout the galaxy."
11300 IFJ>0ANDJ<SCPRINT"We have helped the forces of Princess Le
ya defend the
galaxy. Long live the forces of freedom!"
11500 PRINT
11550 INPUT"Do you want to play again (Y or N)";A$:A$=LEFT$(A$,1
)
```

```
11600 IFA$="Y"THEN150ELSEEND
11800 CLS:PRINT"A voice booms out, ";CHR$(34);"WHO GOES THERE";C
HR$(34)
11850 GOSUB20350
11900 IFVB<>13ORNO<>30THEN5575
11950 PRINTN1$
12000 GOSUB20350
12050 X=31:GOSUB21450:IFY<>-1THEN5575
12100 IFVB<>17ORNO<>31THEN5575ELSE10300
20350 IFBTTHENINPUT"What should I do";CM$ELSELINEINPUT"What shou
ld I do? ";CM$
20395 VB$(0)="":NO$(0)="":VB=0:NO=0:IFLEN(CM$)=0RETURN
20400 FORZL=1TOLEN(CM$):IFMID$(CM$,ZL,1)<>" "THENVB$(0)=VB$(0)+M
ID$(CM$,ZL,1):NEXTZL
20500 FORZL=1TOLV:IFVB$(ZL)<>""ANDLEFT$(VB$(0),LEN(VB$(ZL)))=VB$
(ZL)THENVB=ZL:GOTO20600ELSENEXTZL
```

```
20550 VB=0:NO$(0)=VB$(0):GOTO20650
20600 IFLEN(VB$(0))+1>=LEN(CM$)THENNO=0:RETURNELSENO$(0)=RIGHT$(
CM$,LEN(CM$)-1-LEN(VB$(0)))
20650 FORZL=1TOLN:IFNO$(ZL)<>""ANDLEFT$(NO$(0),LEN(NO$(ZL)))=NO$
(ZL)THENNO=ZL:GOTO20800ELSENEXTZL
20700 NO=0:RETURN
20800 FORZL=1TO1:NEXTZL:RETURN
21050 J=0:FORI=1TOLO:IFOB(I,1)=1LETJ=J+OB(I,2)
21100 NEXTI:PRINT"Out of a maximum of";SC;"points, you have";J;"
points."
21150 IFJ=0PRINT"We're not doing too good."
21200 RETURN
21450 FORZL=0TOLO:IFOB(ZL,0)=XTHENY=OB(ZL,1):GOTO21500ELSENEXTZL
:Y=-99:RETURN
21500 FORZL=1TO1:NEXTZL:RETURN
22000 A$=INKEY$
22010 IFINKEY$=""THEN22010ELSERETURN
30300 SC=215
30450 IFPEEK(16396)=201THENBT=-1ELSEBT=0
```

```
30600 LV=21:DIMVB$(LV)
30650 VB$(1)="GO":VB$(2)="GET":VB$(3)="LOOK"
30700 VB$(4)="INVEN":VB$(5)="SCORE":VB$(6)="DROP"
30750 VB$(7)="HELP":VB$(8)="SAVE":VB$(9)="LOAD":VB$(10)="QUIT"
30800 VB$(11)="PRESS":VB$(12)="SHOOT":VB$(13)="SAY"
30850 VB$(14)="READ":VB$(15)="EAT":VB$(16)="CSAVE"
30900 VB$(17)="SHOW":VB$(18)="OPEN":VB$(19)="FEED"
30950 VB$(20)="HIT":VB$(21)="KILL"
31100 LN=37:DIMNO$(LN)
31150 NO$(1)="NORTH":NO$(2)="EAST":NO$(3)="SOUTH"
31200 NO$(4)="WEST":NO$(5)="UP":NO$(6)="DOWN"
31250 NO$(10)="BUTTON":NO$(11)="TAG":NO$(12)="FUEL"
31300 NO$(13)="BLASTER":NO$(14)="COMMUNICATOR":NO$(15)="GUARD"
31350 NO$(16)="MAP":NO$(17)="KEYS":NO$(18)="NECKLACE"
31400 NO$(19)="SESAME":NO$(20)="GRAFFITI"
31450 NO$(21)="CAPE":NO$(22)="HAMBURGER"
31500 NO$(23)="TAPE":NO$(24)="TURBO"
31550 NO$(25)="SCIENTIST":NO$(26)="PLANS"
31600 NO$(27)="SCHEMATIC":NO$(28)="DEVICE":NO$(29)="GUN"
31650 NO$(30)="SECURITY":NO$(31)="I.D.":NO$(32)="CRYSTALS"
31700 NO$(33)="SIGN":NO$(34)="ROBOT":NO$(35)="PRINCESS"
31750 NO$(36)="DOOR":NO$(37)="AMMUNITION"
31900 CL=37:DIMDS$(CL)
31950 DS$(1)="I'M IN THE PASSENGER & STORAGE COMPARTMENT OF MY S
PACE SHIP.
THERE'S AN EXIT HERE TO LEAVE THE SHIP."
32000 DATA2,0,0,0,0,3
32050 DS$(2)="I'M IN THE COCKPIT OF MY SPACE SHIP.
A LARGE RED BUTTON SAYS >> PRESS TO BLAST OFF <<"
32100 DATA0,0,1,0,0,0
32150 DS$(3)="I'M STANDING NEXT TO MY SPACE SHIP WHICH IS LOCATE
D ON A HUGE FLIGHT DECK."
```



```
32200 DATA18,0,4,0,1,0
32250 DS$(4)="I'M OUT ON THE FLIGHT DECK OF GENERAL DOOM'S BATTL
E CRUISER."
32300 DATA3,5,4,4,0,0
32350 DS$(5)=DS$(4):DATA4,6,5,4,0,0
32400 DS$(6)="I'M IN A HALLWAY. THERE ARE DOORS ON ALL SIDES.
THE DOOR TO THE NORTH SAYS: >> CLOSED FOR THE DAY <<"
32450 DATA7,0,8,5,0,0
32500 DS$(7)="I'M IN THE SUPPLY DEPOT.
AROUND ME I SEE:
ALL KINDS OF THINGS"
32550 DATA0,0,6,0,0,0
32600 DS$(8)="I'M AT THE END OF ONE OF THE HALLWAYS.
I CAN HERE VOICES NEARBY. SOUNDS LIKE GUARDS."
32650 DATA6,10,0,9,0,12
32700 DS$(9)="I'M IN THE STRATEGY PLANNING ROOM.":DATA11,8,0,0,0
,0
32750 DS$(10)="I'M IN THE DECONTAMINATION AREA.":DATA0,14;0,8,0,
0
32800 DS$(11)="THIS AREA IS THE TRACTOR BEAM CONTROL ROOM.
A LARGE SIGN WARNS:  >> DO NOT PRESS ANY BUTTONS <<"
```

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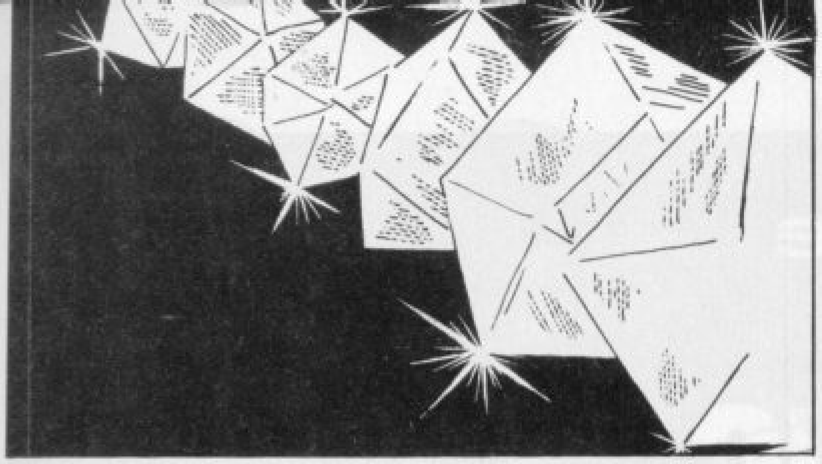
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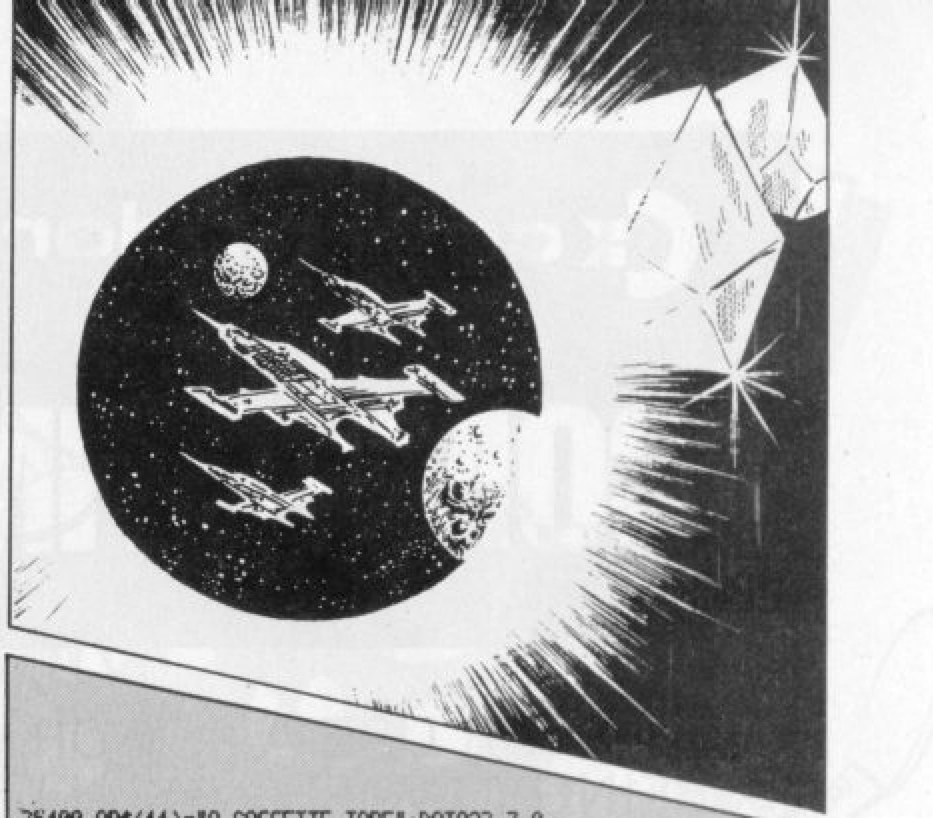
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ACCESS





```
32850 DATA0,0,9,0,0,0
32900 DS$(12)="I'M IN ANOTHER HALLWAY.  TO THE EAST IS A RESTROOM
 "
32950 DATA15,13,0,0,8,0
33000 DS$(13)="THIS IS WHAT IS COMMONLY CALLED ON EARTH,  THE BAT
HROOM.
THERE'S GRAFFITI WRITTEN ALL OVER THE WALL.
PIPES LEAD UP THROUGH THE CEILING."
33050 DATA15,0,0,12,27,0
33100 DS$(14)="THIS APPEARS TO BE AN INTERROGATION ROOM.":DATA0,
0,0,10,0,0
33150 DS$(15)="I'M IN A LOUNGE.":DATA0,0,13,12,0,0
33200 DS$(16)="THIS IS A COMPUTER ROOM.  THERE'S A TRS-80 IN HERE
ON THE SCREEN IT SAYS:  >> CSAVE TAPE <<":DATA17,0,18,0,0,0
33250 DS$(17)="I'M IN A TESTING LABORTORY.":DATA0,0,16,0,0,0
33300 DS$(18)="I'M IN A HALLWAY.
A LARGE ARROW POINTS EAST, AND SAYS: >> TO THE VAULT <<"
33350 DATA16,25,3,19,0,0
33400 DS$(19)="THIS IS THE ENTRANCE TO THE DEVELOPMENT LAB SECTI
ON":DATA20,18,21,20,22,0
33450 DS$(20)="I'M IN A LONG CORRIDOR.  THERE ARE LABORTORIES ALL
 AROUND ME.":DATA19,23,21,20,22,24
33500 DS$(21)="I'M IN A RESEARCH LAB.":DATA20,0,0,0,0,0
33550 DS$(22)="I'M LOST!":DATA22,22,22,22,22,20
33600 DS$(23)=DS$(21):DATA0,0,0,20,0,0
33650 DS$(24)=DS$(21):DATA0,0,0,0,20,0
33700 DS$(25)="I'M NEAR THE ENTRANCE TO THE VAULT.
A SIGN HERE SAYS: >> AUTHORIZED PERSONEL ONLY <<"
33750 DATA0,26,0,18,0,0
33800 DS$(26)="I'M IN THE VAULT.":DATA0,0,0,25,0,0
33850 DS$(27)="I'M IN A PIPE TUNNEL WHICH LEADS IN EVERY DIRECTI
ON.":DATA28,27,27,27,27,13
33900 DS$(28)=DS$(27):DATA29,29,29,29,30,29
33950 DS$(29)="I'M LOST IN A MAZE OF PIPES.":DATA28,29,29,29,29,
27
34000 DS$(30)="I'M IN THE PIPE MAZE.
BELOW ME I THINK I CAN SEE THE JAIL."
34050 DATA29,29,28,29,29,31
34100 DS$(31)="I'M IN THE JAIL."
34150 DATA32,33,34,35,0,0
34200 DS$(32)="I'M IN A JAIL CELL.":DATA0,0,31,0,0,0
34250 DS$(33)=DS$(32):DATA0,0,0,31,0,0
34300 DS$(34)=DS$(32):DATA31,0,0,0,0,0
34350 DS$(35)="I'M AT THE SECURITY DESK.
TO THE NORTH AN ELEVATOR.":DATA36,31,0,0,0,0
34400 DS$(36)="I'M IN THE ELEVATOR.":DATA0,0,35,0,37,0
34450 DS$(37)=DS$(36):DATA0,0,14,0,0,36
34850 LO=23:DIMOB$(LO)
34900 OB$(1)="A TAG WHICH SAYS: >> NEEDS TURBO <<":DATA11,5,0
34950 OB$(2)="ANTI-MATTER FUEL":DATA12,5,5
35000 OB$(3)="BLASTER":DATA13,7,0
35050 OB$(4)="COMMUNICATOR":DATA14,9,0
35100 OB$(5)="A VERY SURPRISED GUARD":DATA15,9,0
35150 OB$(6)="MAP OF THE SHIP":DATA16,29,20
35200 OB$(7)="SOME KEYS":DATA17,9,0
35250 OB$(8)="A SHINESTONE NECKLACE":DATA18,10,20
35300 OB$(9)="PRINCESS LEYA'S CAPE":DATA21,14,5
35350 OB$(10)="MCDONALD'S HAMBURGER":DATA22,15,0
```

```
35400 OB$(11)="A CASSETTE TAPE":DATA23,7,0
35450 OB$(12)="A TURBOENCABULATOR":DATA24,17,5
35500 OB$(13)="AN EVIL LOOKING SCIENTIST":DATA25,17,0
35550 OB$(14)="SECRET ATTACK PLANS":DATA26,0,20
35600 OB$(15)="DEATH RAY SCHEMATIC":DATA27,9,20
35650 OB$(16)="CLOAKING DEVICE":DATA28,17,20
35700 OB$(17)="MICRO LASER GUN":DATA29,24,20
35750 OB$(18)="I.D. CARD":DATA31,17,0
35800 OB$(19)="MALIDIUM CRYSTALS (THE TREASURY!)":DATA32,26,30
35850 OB$(20)="A SIGN WHICH SAYS: >> OUT OF ORDER <<":DATA33,3,0
35900 OB$(21)="ATTACK ROBOT":DATA34,35,0
35950 OB$(22)="PRINCESS LEYA":DATA35,34,50
36000 OB$(23)="AMMUNITION":DATA37,7,0
36150 DIMDS(CL,5):RESTORE
36200 FORZL=1TOCL:FORZD=0TO5
36250 READDS(ZL,ZD):NEXTZD:NEXTZL
36300 DIMOB(LO,2)
36350 FORZL=1TOLO:READOB(ZL,0),OB(ZL,1),OB(ZL,2):NEXTZL
36500 DIMHE$(CL)
36550 HE$(1)="I THINK WE'RE SUPPOSE TO LEAVE THE STUFF HERE."
36600 HE$(2)="I WONDER IF WE HAVE ENOUGH FUEL?"
36650 HE$(7)="HOW 'BOUT A BLASTER."
36700 HE$(9)="TRY SHOOT GUARD."
36750 HE$(13)="IT MIGHT BE INTERSTING TO READ THE GRAFFITI."
36800 HE$(17)="TRY SHOOT SCIENTIST."
36850 HE$(22)="I'M AS CONFUSED AS YOU ARE.":HE$(29)=HE$(22)
36900 HE$(31)="IT MIGHT HELP IF WE HAD SOME KEYS TO OPEN ANY LOC
KED DOORS."
36950 HE$(35)="DID YOU BRING ANYTHING TO EAT?"
37100 M0$="I CAN'T GO THERE.  THE DOOR IS LOCKED."
37150 M1$="I'M NOT CARRYING ANY BLANK TAPE."
37200 M2$="THE TRS-80 RECORDED SOMETHING ON THE TAPE,  AND THEN I
T PRINTED:
>> ATTACK PLANS -- VERY SECRET <<"
37250 M3$="I CAN'T.  I'M NOT CARRYING ANY KEYS."
37300 M4$="O.K.  THE DOOR TO THE JAIL CELL IS UNLOCKED."
37350 M5$="THERE'S NO ROBOT HERE."
37400 M6$="BUT I DON'T HAVE ANY HAMBERGERS."
37450 M7$="CHUMP...CHUMP   BURP!
THE PRINCESS THANKS YOU FOR A DELICIOUS MEAL."
37500 M8$=" DOESN'T EAT HAMBURGER."
37550 M9$="NOTHING HAPPENED.  THE HAMBURGER IS COLD YOU KNOW."
37600 N0$="THE ATTACK ROBOT EATS THE HAMBERGER AND DISSAPEARS."
37650 N1$="I'M AT THE IDENTIFICATION TERMINAL.
ON THE SCREEN IT SAYS: >> SHOW I.D. <<"
37700 N2$="THE TRACTOR BEAM IS OFF."
37750 N3$="THE TRACTOR BEAM IS ON."
37800 N4$="YOU FORGOT TO OPEN THE FLIGHT DECK DOORS."
37850 RETURN
```

Boing



Illustration: Terry Rogers

BARNEY likes bouncing. In fact he likes it so much he bounces everywhere. He bounces off walls. He bounces off ceilings. He even bounces on a trampoline. But so far he has failed to work out that bouncing off the floor is harmful to his health. You have to protect Bouncing Barney from his own folly by making sure the trampoline stays under his flying body as he hurtles up and down. There are ten skill levels to the game — but be warned. Level zero is so easy you might want to bounce directly to level nine. Don't do it! Level nine is for people who don't mind seeing their efforts result in messy consequences. Stick to the lower levels until you have developed your skill — for Barney's sake!

BY RON WEBSTER

RUNS ON AN ATARI IN 8K

```
0 REM BOING BY RON WEBSTER
ATARI TRANSLATION BY JAMES GARON
5 DIM B$(10):FOR I=1 TO 10:READ X:B$(I
)=CHR$(X):NEXT I
10 GRAPHICS 0:POKE 82,5:POSITION 9,1
15 ? "* * * B O I N G ! * * *":?
20 ? "Don't let Bouncing Barney down!"
25 ? "Barney likes bouncing, but he"
30 ? "has trouble staying on his"
35 ? "trampoline. Use the joystick"
40 ? "to keep it underneath him. If"
45 ? "he hits the left side of the"
50 ? "trampoline he bounces to the"
55 ? "right. If he hits the right"
60 ? "side of the trampoline, he"
65 ? "bounces to the left. This af-"
70 ? "fects Barney's bouncing more"
75 ? "and more as the skill level"
80 ? "increases, and makes it harder"
85 ? "to keep him in the air. See"
90 ? "how long you can keep Barney"
95 ? "bouncing.":? :? "Good luck !! ";
100 ? "(Barney needs it!)"
110 OPEN #1,4,0,"K"
120 ? "      Skill level (0-9)?";
125 GET #1,Q:Q=Q-48
130 IF Q<0 OR Q>9 THEN 125
140 H=(Q+2)/4:GRAPHICS 5:POKE 752,1
145 SETCOLOR 4,10,2:SETCOLOR 2,4,2
150 SETCOLOR 0,4,2:SETCOLOR 1,8,12
155 COLOR 1:FOR I=0 TO 5:PLOT I,39:DRA
WTO I,0:NEXT I
160 DRAWTO 74,0:FOR I=74 TO 79:PLOT I,
0:DRAWTO I,39:NEXT I
170 E=1:P=16:A=39:B=A:D=E:COUNT=1:V=14
172 C=INT(RND(0)*2+1)*H-3/2*H
175 POKE 656,0:POKE 657,P:? B$;
180 FOR X=0 TO 16:FOR I=15 TO 32 STEP
17:POKE 656,0:POKE 657,X:? CHR$(I);
185 FOR J=1 TO 10:NEXT J:NEXT I:NEXT X
190 POKE 657,16:? CHR$(11);:FOR I=1 TO
 50:NEXT I:POKE 657,16:? " ";:FOR X=34
 TO 39
200 COLOR 2:PLOT X,B:FOR I=1 TO 10:NEX
T I:COLOR 0:PLOT X,B:FOR I=1 TO 50:NEX
T I:NEXT X:COLOR 2:PLOT A,B
220 S=STICK(0)
225 IF S>8 AND S<12 AND P>2 THEN P=P-1
230 IF S>4 AND S<8 AND P<30 THEN P=P+1
235 SOUND 0,150+2*B,10,V:V=V-2:IF V<0
THEN V=0
240 POKE 656,0:POKE 657,P
242 IF B>38.5 THEN ? " Boing!";:GOTO 2
50
245 ? B$;
250 COLOR 0:PLOT INT(A),INT(B):A=A-C:B
=B-D
255 D=D-0.4
260 IF A<6 THEN A=6:C=-C:GOSUB 400
265 IF A>73 THEN A=73:C=-C:GOSUB 400
270 IF B<1 THEN B=1:D=-ABS(D):E=E-RND(
0)-1:GOSUB 400
275 IF B<38.5 THEN 320
280 B=39:D=E:V=14:LEFT=P+P
285 IF INT(A)>LEFT AND INT(A)<LEFT+14
THEN 310
290 ? :? "S P L A T ! !",COUNT;" Bounc
e";:IF COUNT>1 THEN ? "s"
295 COLOR 2:PLOT INT(A),INT(B):FOR V=1
4 TO 0 STEP -0.1:SOUND 0,253,12,V:NEXT
 V:IF COUNT=1 THEN ?
300 ? "      Skill level was ";Q:GOTO 1
20
310 IF B>38.5 THEN COUNT=COUNT+1:E=E+R
ND(0)/2:C=(A-8-LEFT+RND(0))*H/4
320 COLOR 2:PLOT INT(A),INT(B):GOTO 22
0
400 SOUND 1,200,10,8:FOR TIME=1 TO 10:
NEXT TIME:SOUND 1,0,0,0:RETURN
450 DATA 32,17,18,18,18,18,18,5,32,32
```

PRACTICAL PROGRAMMING

THE WAY TO BETTER PROGRAMS

Basic was designed to be easy to learn, so that people who are not professional programmers can write simple programs for themselves.

It is not easy to write long, complicated programs in any language, and is particularly difficult in Basic for several reasons, the main reason being the lack of suitable control structures.

In order to write a Basic program that works properly it is necessary to begin by designing the program carefully, and producing a detailed specification before beginning to write the code.

Top-down structuring is a method of program design where we begin with a general description of the program. Step by step, we add more details of the procedures the program must perform until we have a description that is sufficiently detailed to allow us to specify the data structure and write the code.

We need to use only a few simple structures in the description:

1. A sequence of procedures that are executed one after the other.
2. IF *condition* THEN *procedure*. If *condition* is true perform *procedure*, otherwise continue with the next section of the program.
3. IF *condition* THEN *procedure 1* ELSE *procedure 2*. If *condition* is true perform *procedure 1*; if *condition* is false perform *procedure 2*; then continue with the next section of the program.
4. REPEAT *procedure* UNTIL *condition*. Perform *procedure*, then test *condition*; if false loop back to *procedure*, if true continue with the next section of the program. Note that the test comes at the end, so that the body of the loop must be performed at least once.
5. WHILE *condition* DO *procedure*. Test *condition*; if true perform *procedure* then loop back to test condition again; if false continue with the next section of the program. Note that here the test is performed first, so that the body of the loop need not be performed at all.
6. CASE i OF *procedure 1, procedure 2, . . ., procedure n*. If i is 1 perform *procedure 1*, if i is 2 perform *procedure 2*, etc,

The essential property of these structures is that they each have a single entry point at the beginning and a single exit point at the end. This makes it possible to write a program outline where the logical flow proceeds straight through from beginning to end.

It is not possible to write Basic code like this because GOTO statements make the logical flow of the program jump around all over the place.

SIMPLE GAMES

To illustrate top-down structuring I will show how a simple game program can be developed. The game is one that has been published in various forms, sometimes in the simple form described here, but usually in a more sophisticated form with extra features.

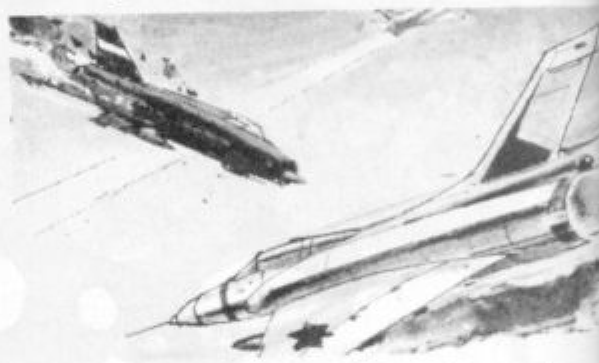
The object of the game is to shoot down a plane which moves across the screen. The gun is fixed in the centre of the bottom line of the screen and is fired by pressing a single key.

We begin with a trivial description of the program:

```
REPEAT play game.
UNTIL game over.
```

To elaborate this we take the procedure "play game" and note that it can be divided into two parts, updating the display and handling input from the keyboard, so the description becomes:

```
REPEAT update display
       handle input
UNTIL game over.
```



"Update display" involves moving the plane, moving the shell if one has been fired, and taking appropriate action if there is a hit. At first sight it may appear that we can expand it to:

```
move plane
IF shell fired THEN move shell
IF hit THEN plane destroyed
```

But if we look more closely at the possible positions of the plane and shell we see that we may have the shell immediately to the right of the plane so the plane will run into the shell. Or we may have the shell one place to the right and one line below, in which case the hit will occur after both the plane and the shell have been moved. Our next expansion of "update display" could be:

```
move plane
IF hit THEN plane destroyed
IF shell fired THEN move shell
IF hit THEN plane destroyed
```

Before continuing with this part of the program we need to look at the "handle input" section.

The description of the program says nothing about when and how often the gun may be fired. Program descriptions are often inadequate but top-down design will reveal where the deficiencies are.

If the gun could be fired continuously there would be no point to the game, so we must introduce some restriction. Two possibilities are to provide a limited supply of ammunition, or to allow the gun to be fired once each time the plane starts on a new line.

If we provide a limited supply of ammunition and allow the

BY TED BALL

gun to be fired at any time while there is ammunition remaining, there could be several shells in motion at one time. To keep the program simple I will use the second possibility.

The "handle input" procedure can now be expanded easily. We have to first check that the gun can be fired — which means that it has not been fired since the plane started on its present line — and if so check for a key and fire a shell if the key has been pressed. The expansion may be written in stages as:

IF gun enabled THEN handle input

IF gun enabled THEN check keyboard
IF key pressed THEN fire shell

and finally:

IF gun enabled THEN check keyboard
IF key pressed THEN set initial shell position
  write shell to screen
  set "shell fired" flag
  clear "gun enabled" flag

THE LISTINGS

Collecting together the sections that have been developed so far gives listing 1. From this we can see that the procedures we need to expand now are "move plane", "move shell" and "plane destroyed".

When we expand "move plane" we must remember to check for the plane having reached the end of its run halfway down the screen or having reached the end of a line on the screen. Thus the first step in the expansion is:

write blank to current plane position
determine new plane position
write plane to new plane position

and for the next step we introduce the checks by expanding "determine new plane position" to:

move plane position one place to right
IF end of line THEN set up for new line
IF end of run THEN set up for new run.

and expanding "set up for new line" and "set up for new run" we get:

move plane position one place to right
IF end of line THEN set plane
  position to start of next line
  decrease score value
  set "gun enabled" flag
IF end of run THEN add 1 to plane count
  set plane position to start of screen
  set score value to initial value
  set "gun enabled" flag

"Move shell" is expanded in a similar way, but remembering to delete the shell when it reaches the top of the screen:

write blank to current shell position
move shell position up one line
  IF off screen THEN clear "shell fired" flag
  ELSE write shell to new position

"Plane destroyed" appears in two places and in the final program we will obviously want to implement it as a subroutine.

To indicate this we will replace "plane destroyed" in the body of the program description by "subroutine (plane destroyed)" and put the expansion in a separate section at the end.

The expansion of "subroutine (plane destroyed)" is straightforward:

clear "shell fired" flag
simulate explosion on screen
add score value to player's score
set up for new run

with "set up for new run" being expanded in exactly the same way as before.

This leaves the final test "game over" to be expanded. Since the game consists of shooting at a fixed number of planes "plane count more than number of planes".

Putting these latest expansions into the program description of listing 1 gives the final program description shown in listing 2.

This final description gives almost all the detail we need to write the program.

Listing 1: Intermediate Program Description

```
REPEAT move plane
  IF hit THEN plane destroyed
  IF shell fired THEN move shell
  IF hit THEN plane destroyed
  IF gun enabled THEN check keyboard
  IF key pressed THEN
    set initial shell position
    write shell to screen
    set "shell fired" flag
    clear "gun enabled" flag
UNTIL game over.
```

Listing 2: Final Program Description

```
REPEAT write blank to current plane position
  Imove plane position on place right
  IF end of line THEN
    set plane position to start of next line
    decrease score value
    set "gun enabled" flag
    IF end of run THEN
    add 1 to plane count
    set plane position to start of screen
    set score value to initial value
    set "gun enabled" flag
  write plane to new position
  IF hit THEN subroutine (plane destroyed)
  IF shell fired THEN write blank to current shell position
    move shell position up 1 line
    IF off screen THEN clear "shell fired" flag
    ELSE write shell to new position
  IF hit THEN subroutine (plane destroyed)
  IF gun enabled THEN
    check keyboard
  IF key pressed THEN
    set initial shell position
    write shell to screen
    set "shell fired" flag
    clear "gun enabled" flag
UNTIL plane count more than number of planes

Subroutine (plane destroyed):
clear "shell fired" flag
simulate explosion on screen
add score value to player's score
add 1 to plane count
set plane position to start of screen
set score value to initial value
set "gun enabled" flag
```



THE IMPORTANCE OF CURVES...

If you want to produce interesting displays for your video games then it is essential to be able to draw curves.

Straight lines tend to be characteristic of man-made structures and not of natural objects. Most high resolution graphics systems on micros have commands such as DRAW or PLOT for drawing straight lines, but do not have commands for drawing curves. For this reason, a curve has to be approximated by a series of linked line segments.

The shorter the segments are, the more a realistic the approximation to the curve becomes. The limit to which this can be taken is determined by the resolution of the display screen. With any system having a screen resolution of, say, 256 by 192 or better, convincing curves can be drawn by joining points in adjacent screen columns as long as their vertical separation is not too great. These thoughts naturally lead to the problem of scaling.

The basic idea with scaling is that when a particular curve is to be drawn it must be scaled — magnified or diminished — in such a way that it fits on the screen, and is also displayed to best effect.

This is probably best illustrated by an example, so let us examine how to draw two cycles of a damped sine wave on the Atom's screen, which has a resolution of 256 by 192. With a damped sine wave, the size of the oscillations decreases as the waveform proceeds. The equation of the curve we shall plot is:

```
Y = SIN (X) *EXP ( - X/8)
```

Now two cycles are obtained by letting X vary from 0 to 4π. To plot the curve across the screen with full resolution, we start with a dot in column 0, on the left of the screen, and repeatedly draw a line to a dot in the next column, doing this 255 times until we get to the right hand side.

To make X increase from 0 to 4π in this pattern, it must be repeatedly increased by increments of $4\pi/255$. Thus the kernel of the program becomes

```
FOR I = 0 TO 255
X = I *(4 *PI/255)
Y = SIN (X) *EXP ( - X/8)
DRAW I, Y
NEXT I
```

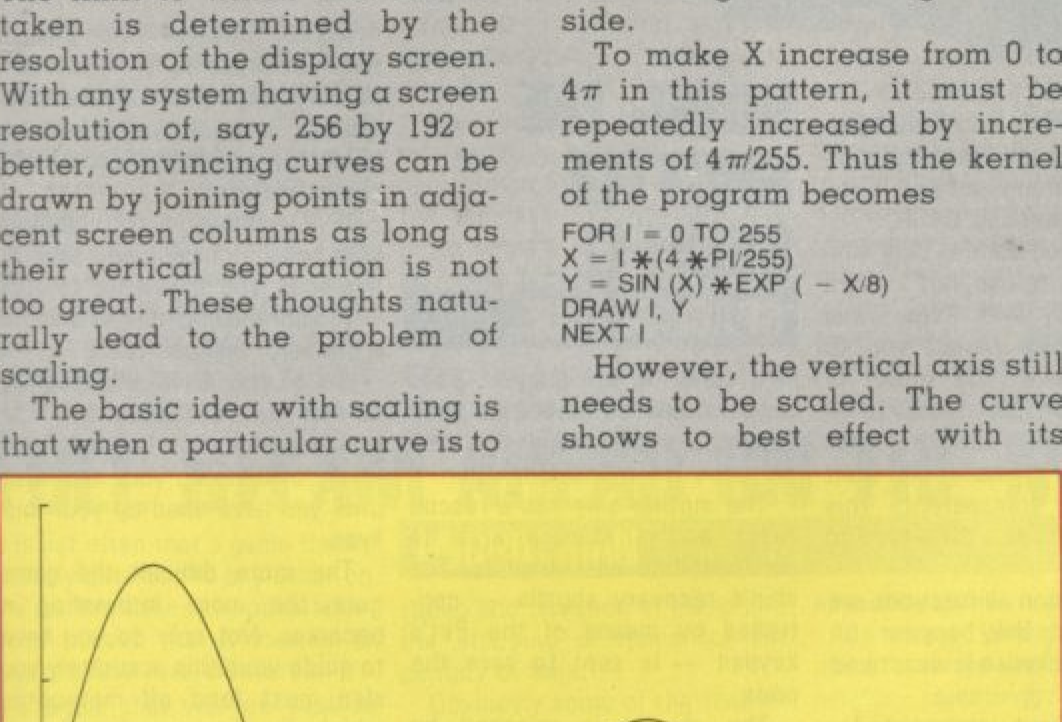
However, the vertical axis still needs to be scaled. The curve shows to best effect with its x-axis across the middle of the screen, so we place it along row 95. Assigning 90 dots vertically to the full amplitude of the sine wave gives the final, tided-up, Atom program.

```
10 %S = 4 *PI/255
20 CLEAR 4
30 MOVE 0, 95
40 FOR I = 1 TO 255
50 %X = I * %S
60 %Y = % (90 * SIN(%X) *EXP
( - %X/8)) + 95
70 DRAW I, %Y
80 NEXT I
90 END
```

Experimenting with this program by changing the numbers in it will give a further feeling for how the scaling, positioning and damping are achieved.

To illustrate how simple matters such as scaling and positioning can be made, consider the drawing shown in the figure, which includes not only our curve, but also two axes and a label. It was drawn using a Hewlett-Packard HP7225A graph plotter attached to an HP 83 personal computer. The program that produced it is:

```
10 GCLEAR
20 SCALE 0, 4 *PI, -1,1
30 XAXIS 0 PI/2
40 YAXIS 0 0.5
50 MOVE 0,0
60 S = 4 * PI/255
70 FORX = S TO 4 * PI STEP S
80 DRAW X, SIN (X) * EXP (- X/8)
90 NEXT X
100 CSIZE 6, 0.5, 0.25
110 MOVE PI, - 0.2
120 LABEL "DAMPED SINE WAVE"
130 END
```



In this program the SCALE instruction in line 20 gives the lower and upper limits of the X values to be plotted and also of the Y values. All plotting can then be performed using the actual values to be plotted since the system can then automatically position them correctly.

Of course, the HP personal computer is a sophisticated and expensive system, but its capabilities illustrate what can be done, and also the direction which graphics facilities for micros are likely to take.

By Gary Marshall

THE GOSPEL TRUTH . . .

THE BIBLE

Have you heard any claps of thunder recently? It could be that someone in your area has bought a copy of The Bible. Not the authorised version or even the New English but the version according to Automata — and in doing so has angered the almighty!

The Bible is an irreverent look at some of the happenings in that epic story. The extracts are illustrated by games played on the ZX81 computer. There are ten games and all of them are within 1K of memory.

Don't just load the games though. Unplug the ear lead and listen to the story recorded on the tape. The nearest I can come to describing it is a version of Not the Nine O'Clock News on tape.

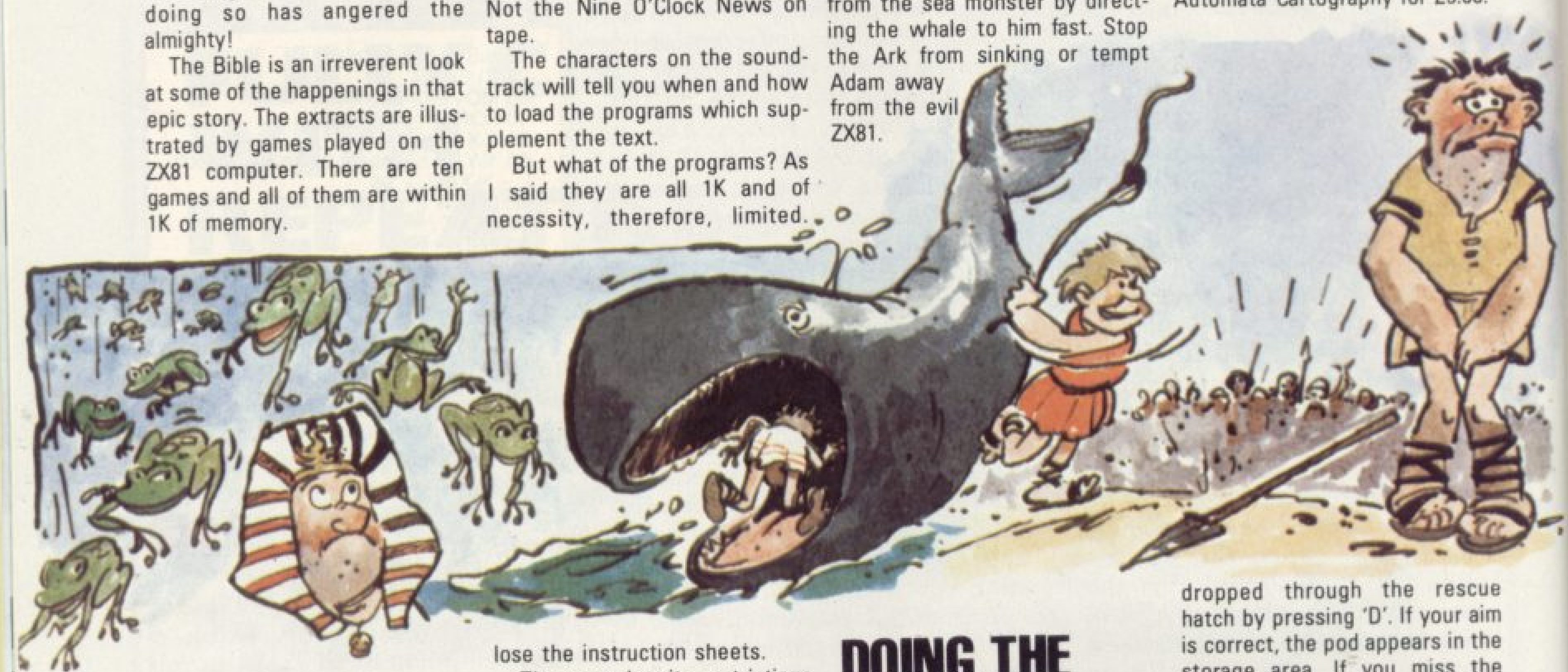
The characters on the soundtrack will tell you when and how to load the programs which supplement the text.

But what of the programs? As I said they are all 1K and of necessity, therefore, limited. Most of them I have seen before in one form or another.

I did find one or two quite amusing. Goliath's soft spot is no longer his forehead but somewhere lower down and almost as painfull. You can also bring down the plague on the Pharoahs head and free the slaves. Save Jonah from the sea monster by directing the whale to him fast. Stop the Ark from sinking or tempt Adam away from the evil ZX81.

If you have just bought a ZX81 then this tape will provide some amusement. The same might apply if you have a warped sense of humour. Otherwise I can find little of any value in it for those of you looking for original games software.

The Bible is available from Automata Cartography for £5.00.



CUBE WILL HAVE YOU IN A SPIN

QUADCUBE

There seems to be very little middle ground with The Cube — either you can't stop twiddling it or you just don't want to know. Here's a game for the fanatics.

This program simulates a 4 × 4× 4 cube — physically very difficult to make, but easy on a computer. The program can to a limited degree simulate a 3 × 3 × 3 cube. The object is — of course — to solve the cube in as few moves as possible.

In Quadcube the display is slightly distorted but recognisable. I liked 'co fidence tones' on the key presses — all input is handled by 'call key' routines, and there is an immediate indication that your pressed key has been scanned.

Documentation supplied was of a high standard. There is also adequate internal documentation for when, as always happens, you lose the instruction sheets.

The game has its restrictions. The graphics are unsatisfactory on a monochrome set and it will not run in extended BASIC.

The notation used is very simple and easy to use, but I was a little unhappy with "spin" and "unspin" which permit you to view the back. The effect of "spin" and "unspin" seems to be to present you with a mirror image — or to make the front three faces transparent. This makes the moves a little hard to visualise.

In this version all rotations are described as they appear on screen — clockwise is described as right.

I would have appreciated a small note on screen to indicate which face was X, which Y, and which Z. Memory space is tight but the program can be compacted to permit this, without losing any features.

You can scramble a virgin cube and watch the computer put it back, or the computer will scramble the cube.

The game runs on a Texas Instruments 99/4A in TI Basic and comes in cassette form for £9. It is available from Luton based Workforce.

DOING THE SHUTTLE SHUFFLE . . .

SPACE RESCUE

Five spherical life support pods are stranded on hazardous alien terrain. In space the mother ship prepares for a rescue mission.

The mother ship has a rescue hatch and a storage area to accommodate all five pods. The ship's recovery shuttle — controlled by means of the Pet's keypad — is sent to save the pods.

The shuttle is released by pressing '2' to move it downwards. From this point on your score increases by one for every second you survive.

To rescue a pod, the shuttle must be positioned immediately above it, then the 'A' key pressed. This manoeuvre can be very difficult on the higher skill levels since the shuttle moves rather fast and the control key becomes highly responsive.

Next the shuttle should be guided to a position just above the mother ship and the pod dropped through the rescue hatch by pressing 'D'. If your aim is correct, the pod appears in the storage area. If you miss the hatch the pod lands back on the planet surface.

If you manage to complete your rescue mission and save all five pods, you are invited to dock with your moving mother ship for a bonus of 500 points.

Once you have successfully carried out a rescue you can progress to slightly higer skill levels building up your expertise until you have used up your four lives.

The more difficult the game gets the more interesting it becomes. Not only do you have to guide your ship accurately you also must fend off meteorites which fly dangerously through the sky.

No additional documentation was supplied with the game which would have been useful. The instructions only appear on the screen briefly, once, after loading so some experimentation was needed to learn the finer aspects of the game.

Supersoft, the supplier of Space Rescue, has created another addictive game because like most good ones it cannot be easily mastered. You can try it out for £8 plus VAT.

FINE ART OF SPACE FIGHTING

GAMESTAPE 2

You can journey to the stars, unravel the mysteries of the pyramids or become an artist with Gamestape 2, which has three 16K programs for the ZX81. First on the tape is Starfighter.

The enemy are trying to destroy your civilisation. You must stop them by flying your Starfighter and shooting them down with your lasers.

The screen displays the view from your cockpit with stars and a firing cursor in front of you. The cursor, your laser sights, are controlled by pressing keys one to nine, while the zero key fires the laser.

This layout can be confusing until you get used to it. I used a stickly label on the keyboard to remind me of the keys that give the diagonal moves, one to four.

The enemy starships are shown as H, X and O on the screen. Each has a different score value. If you can manage to hit twenty of them before your energy runs out you get a replay. I would have liked to have seen two or thress starships on the screen at once or see them fire back to liven the game up a bit.

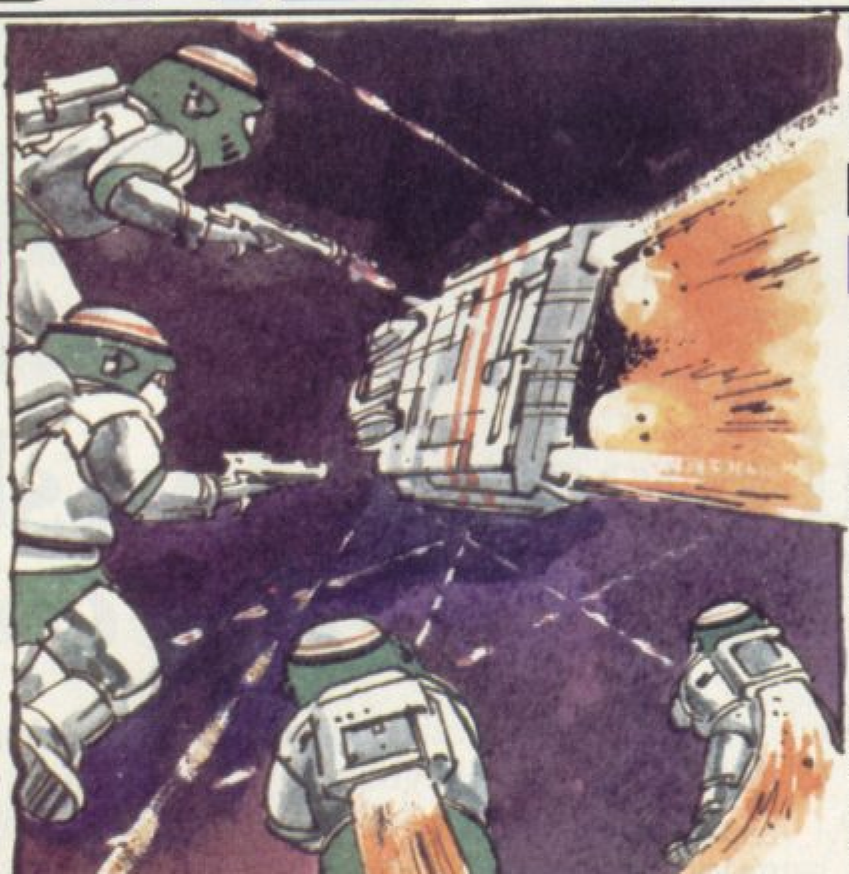
Second on the tape is Pyramid — the classic puzzle where a pyramid has to be moved from A to B via C piece by piece.

The pyramid shown on the screen has nine layers and the pads lettered A, B, C and a promt are also displayed. Movement is controlled by pressing the appropriately lettered keys, the computer will automatically move the top layer of the pile. This game takes a very long time to play, the suppliers reckon that 511 moves are the minimum.

Turning over the tape gives us Artist. The usual "draw a picture on your television screen" type program. However this one does have some major differences. After you have finished your drawing you can store it in one of 10 memories for retrieval later if you wish.

If you own a Sinclair printer the drawing can be copied on to it. The sticky label used in Starfighter can also be used here as the input commands are the same.

This tape must be rated as good value for money and is available from J.K. Greye Software, of Bath, and costs £4.95.



DUCKING AND WEAVING UP IN THE STARS

COSMIC ZAP

Cosmic Zap is one of the new games for the Sharp MZ-80K from the London based firm — Sharpsoft. Written in Basic in under 6K it is fairly slow for a real-time graphics game. However, the quality of finish is very high with some nice trimmings such as storing the top five high scores and initials.

The aim of the game is to pilot your ship through space for ten minutes using left, right and stop controls to dodge asteroids whilst trying to ram assorted aliens with scores ranging from 10 to 100 points. After a while asteroids start appearing in your path and an alien you are about to ram can suddenly turn into a deadly asteroid. If you last 10 minutes, which is some feat, a mother ship appears and uses a tractor beam to draw you in for docking.

At £5.85 all the Sharpsoft games are quite expensive and I do not feel that this game represents such good value for money as say Asteroids or Stockmarket F. As far as I can tell there are no good tactics in this game of reflexes, although on the whole I found it quite good fun.

FULL STEAM AHEAD ON THE MICRO RAILROAD

MICROTRAIN

It is not often that a game that is entirely different to any other on the market makes an appearance, but I believe that Microtrain is one of these rare creatures.

Imagine that you are back in your childhood with hundreds of pounds worth of electric train set to play with then you get the basic idea of Microtrain.

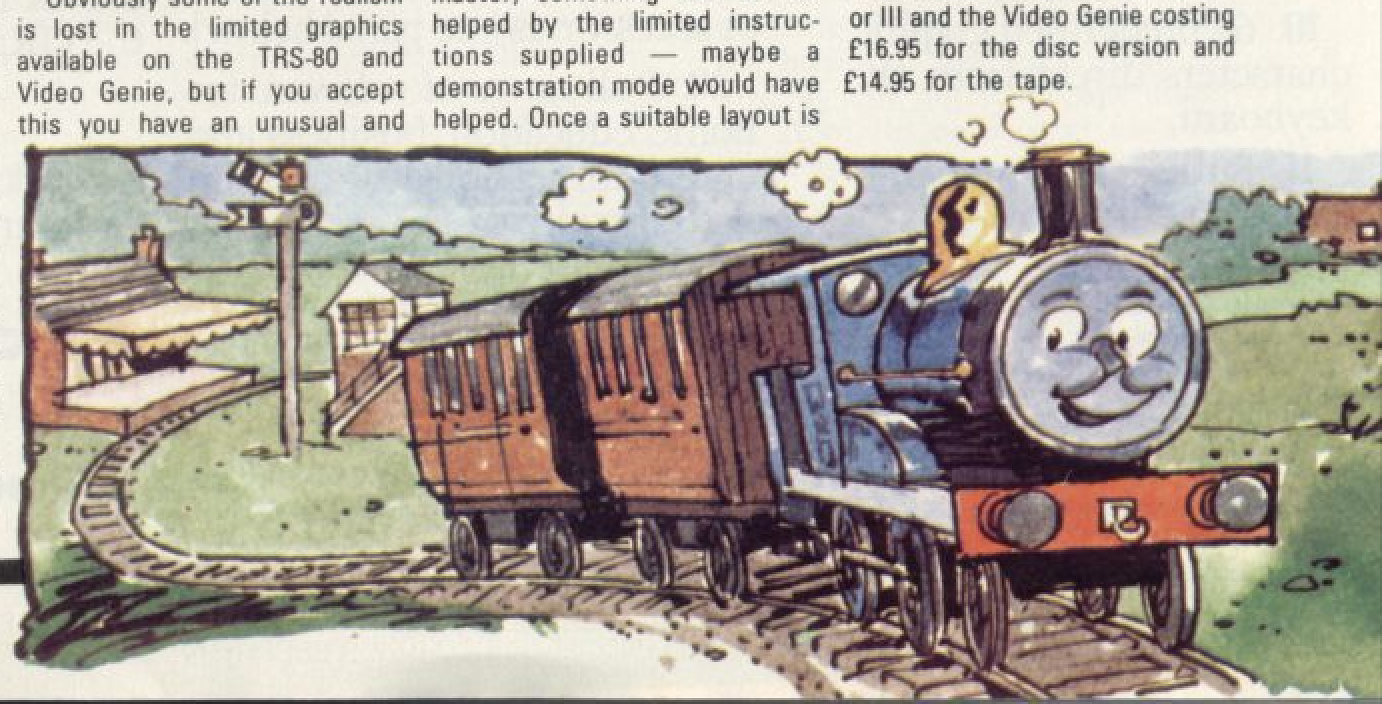
Depending on the memory available you can play with up to 255 trains with a combined number of coaches/wagons of up to 255. You are also allowed up to 255 controls, and this is where the game gets interesting as the controls may be set to react depending on the conditions on the track.

The controls that you have available are points, signals, speed and direction of trains and the stopping of trains for set periods of time.

Obviously some of the realism is lost in the limited graphics available on the TRS-80 and Video Genie, but if you accept this you have an unusual and appealing game.

Be warned though, the automatic controls are not easy to master, something that is not helped by the limited instructions supplied — maybe a demonstration mode would have helped. Once a suitable layout is achieved, the screen after screen of track may be saved for future loading.

Microtrain is available from Premier Publications of Croydon. It runs on a Tandy TRS-80 model I or III and the Video Genie costing £16.95 for the disc version and £14.95 for the tape.



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Kit Korner

BY KEITH MOTT

THE POWER OF THE ATOM. . .

It is refreshing to see, in these times when the reliability of some newer machines has yet to be proven, an already well established product which can be expanded from a useful basic kit to a powerful multi-program microcomputer. I have been looking over a kit built Acorn Atom — and found it to be just that.

The Atom is a single board layout, measuring 14 by eight inches. The basic kit has an 8K BASIC and 2K of RAM but can be expanded to 12K RAM. The MPU is the trusty 6502 running at 1MHz, although there is a second crystal to run the Motorola video chip. Make sure which is which, as they are both the same size and shape. Only the numbers are different.

The full QWERTY keyboard is mounted on the other side of the board from the components as is the speaker. The power supply is entirely separate, however.

The Atom has an advantage over some of the smaller and more recent machines in that it has the facility for a 6522 Versatile Interface Adaptor (VIA) on the board.

The Atom also allows for other input/outputs. There is a printer interface, which uses one half of the VIA, a standard CUTS interface for the recording or playing back of programs, a composite video and T.V. output. Not all of these are fitted as standard to the basic model, so find out which ones you are going to need before buying as it will be slightly cheaper.

As there are 52 potential IC sockets on the board it is worth mentioning that 14 pin sockets will go into 16 hole sets, as will 14 and 16 into 18 hole sets. If you do solder in the wrong size it is often impossible to retrieve it unless you have an IC desoldering tool for your soldering iron.

The only real way to extract them otherwise is to force the plastic moulding off and to remove the pins individually. You will have to replace the holder then, of course. The same applies to the larger sockets, although these are a little easier to differentiate between.

One major point that does worry me about the Atom is the way Acorn have arranged the keyboard, however smooth it is to operate. Acorn recommend a quite simple way of installing it in the instructions. They also state that insulating washers should be used with the steel screws to prevent shorting out of the keyboard matrix. This is because all but one of the screws falls between two adjacent pads.



Although the model I was appraising did not have any washers, with the length of connector wire on each of the keys it is possible for them to short out despite this precaution. They also suggest that you do not solder each of the connections too heavily as you may break the plated-through hole. It appears to me that it would be as easy to fracture the lead as it would the pad when the solder contracts as it cools. This would lead to an almost incurable fault as all the keys would have to be removed before repairs could be effected. I am sure the solid contact type would be preferable.

The board has been constructed well on thicker-than-usual piece of fibreglass with silk screen overlay to help place the components.

There are a few components, however, which have to have their legs bent quite considerably to get them positioned correctly. I am sure that some of the capacitors and especially the crystals could be damaged easily by this action by an overzealous assembler.

Everything else seems to go in quite neatly even though the voltage regulators do look a little hidden from view by their common heat-sink.

As is usual with the better designed kits the holes for the transistors are laid out for insulating pads although these are not included. Thankfully these transistors are of a larger body type than the ones which started off my campaign, and should tolerate a little more heat than those could.

As all the IC holders are supplied take care that you insert the right chips in the right sockets. Fortunately, all the chips are orientated with pin one towards the top or right of the board, which helps considerably. Another point about orientation is the electrlytic capacitors which are used to smooth the power supply. They are scattered around about the regulators and vary in their direction of polarity. Each is marked with its own polarity as is the board where it resides, so there should be no excuse for getting it wrong.

The Acorn Atom comes in a very sturdy case which is the size of many machines' keyboard alone. Even though not all the possible options are included in the basic kit the back panel is already cut out to accept them all. It would be a good idea to block up the larger holes to prevent dust and dirt from getting into the machine, so long as the regulators do not get too hot.

The power supply, as I said is separate from the machine, and plugs into the back of the box. It is heavy enough to power all of the options and more. External power is available from one of the back connectors if required.

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DOWN TO BASIC

BY MOIRA NORRIE

STORING AWAY YOUR SCORES

Sometimes it is necessary to store a set of related data items while processing them in a program. For example, you might want to store a set of game scores and then sort them into order.

To do this you can store them in a list — or, as it is sometimes known, a one-dimensional array.

To create such a list, you must first of all inform the computer of the name and size of the list. This is done by using a DIMension statement which takes the form

⟨line no.⟩ DIM ⟨array–list⟩

For example,

```
15 DIM A(30)
```

would set up a list called A which could hold up to 30 data items. It is possible to declare several lists in one DIM statement.

```
20 DIM L1(5),L2(5),L3(100)
```

In general, the rules for forming names of lists will be the same as those for forming names of variables.

To refer to a particular item of a list, use subscripts enclosed in brackets after the name of the list. The subscript indicates the position of the item in the list.

A(6)

refers to the item in position 6 of the list called A.

A subscript may be a constant, variable or any other valid arithmetic expression. If the value of the subscript is non-integer, then it will be truncated to an integer value.

The value of the subscript should lie in the range:

1 —> (size of list)

In some systems, the subscript may also take the value 0.)

Elements of lists are sometimes referred to as "subscripted variables", and may be used in a manner similar to ordinary variables. The following are all



examples of statements containing subscripted variables:

```
10 INPUT A(2),X,L1(10)
30 LET S = A(1) + A(2)
40 PRINT B(6)
25 IF A(1) = A(2) THEN 10
30 FOR I = A(N) TO A(N+6)
```

LISTS, STRINGS AND CHARACTERS

It is also possible to have a list of character strings e.g. a list of names.

Such a list may be created in a manner similar to a list of numeric values except that the name of the list is followed by a *"5"*.

```
10 DIM A(10),N$(5)
```

would set up a list A, comprising of up to 10 numeric values, and a list N5, comprising of up to five character strings.

The subscripts of a string array follow the same rules as those of an ordinary one-dimensional array (list), and the items of a string array may be used in a manner similar to string variables.

GETTING THINGS IN ORDER . . .

A very common operation in computing is sorting a list of items into order e.g. sort a list of heights into ascending order, sort a list of names into alphabetical order. I will now look at a program that could be used to sort a list of 10 numbers into ascending order.

I should point out that the method I shall use is only one of many sort methods. It is a fairly simple method but not the most efficient. The choice of a sort method depends on the number of items to be sorted and the attributes of these items. Many commercial applications involve sorting very large numbers of items in which case efficiency becomes very important. The method I shall describe should suffice for the most simple applications.

This method basically consists of working through the list comparing pairs of adjacent items —

DOWN TO BASIC

if necessary swap the items so that they are in the correct order with respect to each other.

```
rem input data
repeat for each position in list
  input item in list-position
end repeat
repeat for each cycle
  let swap count = 0
  repeat for each pair
    if pair in order then goto end
      repeat pair
      swap pair
      add 1 to swap count
  end repeat pair
  if swap count = 0 then goto
print results
end repeat cycle
rem print results
repeat for each position in list
  print item in list-position
end repeat
```

This general program outline can be expanded into the following program. The best way to understand the program is to work through it using pencil and paper with some sample data.

NOW GET DOWN TO WORK . . .

```
10  REM SORT 10 NOS IN
    ASCENDING ORDER
20  REM INPUT THE 10 NOS.
30  DIM A(10)
40  FOR I=1 to 10
50    INPUT A(I)
60  NEXT I
70  REM SORT NOS.
80  FOR I=1 TO 9
        90    LET S=
100   FOR J=9 TO I STEP -1
110     IF A(J)<=A(J+1)
120       REM SWAP A(J) AND
    A(J+1)
130       LET T=A(J)
140       LET A(J)=A(J+1)
150       LET A(J+1)=T
160       REM ADD 1 TO
     SWAP COUNT
170       LET S=S+1
180   NEXT J
190   IF S=0 THEN 210
200 NEXT I
210 REM PRINT RESULTS
220 FOR I=1 TO 10
230     RINT A(I);
240 NEXT I
250 END
```

In the worst case, all cycles would have to be performed before the numbers were in order. However, in many cases the numbers will be sorted before the last cycle. For this reason, a count of the number of swaps in any cycle is included. If in any cycle there are no swaps, then the numbers are in order and there is no need to continue.

NEXT MONTH

It is possible to have an array with more than one dimension. The commonest case being the two-dimensional array — a table of related data items. Next month, I will describe the use of these two-dimensional arrays and I will also include an example showing the use of string arrays.

The version of Basic summarised in the next issue will be the Atari.

COMMODORE BASIC

VARIABLES: Names of variables may be of any length and consist of any combination of letters and digits provided they start with a letter — however, only the first two characters are significant.

If a variable name if followed by %, it is an integer numeric variable and will take only integer values.

Integer variables cannot be used as control variables in a FOR loop.

STATEMENTS: Can have more than one statement per line using a ":" as a separator.

Numeric values will be converted from one type to another type when necessary e.g. if a real value is assigned to an integer variable, then the real value will be truncated to an integer.

The form of the IF statement is either of

〈line no.〉 IF 〈condition〉 THEN 〈statement(s)〉

〈line no.〉 IF 〈condition〉 GOTO 〈line no.〉

The ON statement can be used to transfer to one of a list of line nos. depending upon the value of a given expression

〈line no.〉 ON 〈expression〉 GOTO 〈list of line nos.〉

〈line no.〉 on 〈expression〉 GOSUB — list of line nos. 〉

CLR clears all variables and memory space.

END terminates execution — can appear at any point in the program.

GET reads a character from a file or the keyboard buffer.

NEXT if no variable, then it is matched with the most recent FOR statement.

POKE writes specified value at specified memory address.

SYS used to call an assembly language subroutine.

WAIT used to suspend program execution.

FUNCTIONS: **ASC** returns the ASCII code of the first character in the specified string.

CHR$ converts code number to character.

FRE returns the amount of free memory space.

LEFT$ returns the leftmost characters of a string.

MID$ returns a specified substring of a string.

PEEK value of byte in specified memory address in range 0 to 65535.

POS returns the cursor position.

RIGHT$ returns the rightmost characters of a string.

SPC used in a PRINT statement to supply spaces.

STATUS returns status corresponding to last I/O operation.

STR$ converts number to character string of digits.

TAN tangent.

TIME read internal clock.

USR calls the user's assembly language subroutine.

VAL treats the specified string as an arithmetic expression.

Plus ABS, ATN, COS, EXP, INT, LEN, LOG, RND, SGN, SIN, SQR, TAB.

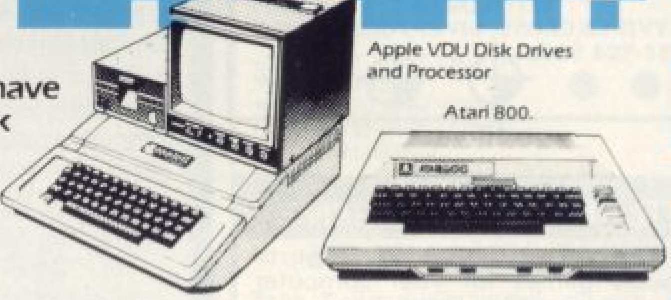
GRAPHICS: Screen has 25 rows and 40 columns.

Special graphics characters.

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HARDCORE

A GAMES PLAYERS GUIDE TO THE VIC-20

The prospect of a low-cost colour computer supported by a company of Commodore's pedigree was the rich promise offered to the personal computer public last summer.

The promise was some time being fulfilled as a large backlog of orders built-up while the bulk shipping of computers from the German factories was delayed. But the personal computer user is used to frustrations of this sort and waited patiently. Now the VIC is rewarding that patience with a quickly growing range of games and game peripherals and a sales figure of 15,000 a month.

For your £199.99 (after VAT) you will receive the VIC computer complete with a QWERTY keyboard, a lead to plug into a home T.V. and a power supply lead. It comes complete with 3.5K of usable memory.

The VIC's bright colours and graphics are well suited to gaming and a dozen firms are producing games software for the machine. The peripherals come from just a few firms but there is already a wide range. Names and addresses are laid out below — if an address is missing it will be included elsewhere.

Commodore is based at 675, Ajax Avenue, Slough Trading Estate, Slough, Berks. SL1 4BG.

EXPANDING MEMORY

The VIC-20 comes with 3.5K of usable memory and serious users will soon have to start thinking of expanding.

There is quite a choice about how you increase your VIC's memory. Commodore produces a memory expansion board which plugs on to the back of the machine and allows the user to stick in extra memory cartridges.

The Commodore cartridges presently available offer an extra 3K, 8K and 16K of RAM — £29.95, £44.95, £74.95 respectively. The memory board connects to the VIC expansion port, and has six ports to allow the user to have all three memory cartridges, plus programming aid cartridges plugged in at once, it costs £125.95.

Stack has a wide range of memory expansion kits using a piggy-back technique. 3K costs £25; 8K, £82 and £69; 16K, £124 and £99; 24K £167 or £129.

Stack also offers a special memory board which allows the user to protect 16K of memory so that programs can be kept in while the machine is switched off. A battery keeps the programs in memory for up to a year and with 19K of memory it costs £198.

Stack Computer Services is at 290/298 Derby Road, Bootle, Liverpool 20, Merseyside.

Arfon Micro has a VIC expansion system which allows up to seven cartridges to be added on to the machine. The memory expansion board costs £85 and the firm also produces three memory cartridges. 3K costs £26.04; 8K, £39.09 and 16K £65.17 (all plus VAT).

Arfon Microelectronics can be found at Cibyn Industrial Estate, Caernarfon, Gwynedd, North Wales.

Beelines gives the user a chance to expand his VIC up to 35K and have a 40 column by 24 row layout compatible with the viewdata standard. This expansion unit costs £253. Beelines is at 124, Newport Street, Bolton, BL3 6AB.

CHARACTER DEFECTS

The main criticism of the VIC is the lack of character space it allows on the screen.

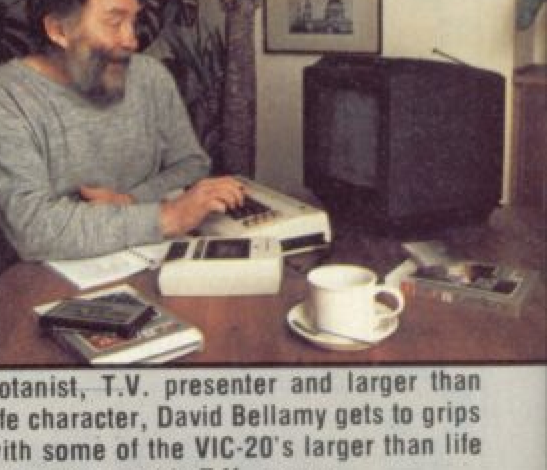
The screen layout is 23 lines deep and 22 characters long. As a result the text seems too clumsy to be pleasant to read and only short areas of a program can be listed on screen at any time. Each character is formed by an 8 × 8 bit matrix, so in high resolution mode there is a possible 176 × 184 points to play with.

Up to 16 colours can be generated by the machine. Each character and the screen border can be one of eight different colours and the background, one of 16 possible colours.

Sound wise the VIC is equipped with four voices, alto, tenor, soprano and white noise. It also offers a volume control which ranges from 0 to a very loud 15.

Copying arcade games is usually a good test of a computer's sound and graphic facilities and the VIC produces some very faithful copies. The range of graphics characters provided by the VIC can be supplemented by defining your own graphics made up of 8 × 8 pixels.

Commodore produces a super expander hi-res cartridge to help improve the graph-



Botanist, T.V. presenter and larger than life character, David Bellamy gets to grips with some of the VIC-20's larger than life characters on his T.V. screen.

HARDCORE

A GAMES PLAYERS GUIDE TO THE VIC-20

ics capabilities and it costs £34.95. It includes commands like: paint, colour, draw, circle and sound.

SOFTWARE SUPPLY

Software for the VIC is growing in supply to meet demand.

At least 10 software firms are turning to VIC-20 production, some of which began in the business by supporting the Pet so many of the programs first on sale for the VIC are conversions.

Mr Micro of Manchester is an example of this type of firm. It started with Pet programs but now has moved on to VIC games. Over 40 programs are listed in his catalogue including Gold Rush which is a similar idea to the recently solved puzzle, posed in the book *Masquerade*. The object is to win a real nugget of gold by solving the game, the nugget going to the first person to do so. Another is a game entitled the Great Ballon Race.

Mr Micro can be reached at PO Box 24 Swinton M27 3AL.

Bug Byte is another major supplier having moved on from the Sinclair ZX81 and the Acorn Atom. on its lists at the moment are Vicmen, which is a version of Pacman, Vicgammon (backgammon), and a version of breakout called Another Vic in the Wall.

D K'tronics is in the process of building up its VIC-20 software library. Currently with Rox and Deflex on the books and one cassette with ten programmes. They cost £4.95 each and £6.95 for the multi program pack. An 8K hi-resolution Rox will soon be available for £4.95.

Some 17 programs are on the catalogue from Audiogenic including well-known games like Alien in which you have to trap foreign beasts and bury them in holes in the ground. That costs £7.99 for the pleasure. Also on the list is Star Wars the game based on the adventures of film screen here Luke Skywalker. It costs £6.99.

Audiogenic imports games software from the American firm Creative Software who supplies VIC programs. The firm can be reached through PO Box 34-36, Crown Street, Reading, Berkshire.

Liverpool based Supersoft is just beginning to branch into VIC software after having been one of the leading Pet software suppliers. First off the production line is an eerie game called Nightmare Park which should sell for £4.99. And a war-based game Tank Battle is shortly to be available but has not got a fixed price yet.

For further details write to Supersoft at 1st Floor, 10-14 Canning Road, Wealdstone, Harrow, Middlesex.

Smaller firms providing a more limited range of software are as follows: Anglo American Software, 138a Stratford Road, Sparkhill, Birmingham, B11 1AG; Big Softie, 5, Ashton Park, Belfast, BT10 0JQ; Bridge Software, 36 Fernwood, Marple Bridge, Stockport, Cheshire; G. Moore, 4, Ackers Road, Woodchurch, Birkenhead, Merseyside; Gibson & Harvey Enterprises, 49 St Leonards Road, Bexhill on Sea, East Sussex; Hi-Tech, 7 Queensway, Hemel Hempstead, Hertfordshire.

Thorn EMI is also in the process of developing software for the VIC-20.

Commodore itself is supporting the VIC with a range of ROM cartridges and also has a very addictive cassette game called Blitz. It costs £4.99.

JOY OF STICKS

Any gamer who has struggled with four directional keys while trying to keep half his mind focussed on the "fire" button knows who put the "joy" in front of "stick".

The VIC-20 currently has two joysticks available. The Commodore version costs £7.50 and includes a fire button.

Stack Computer Services includes joysticks in its large range of VIC peripherals. These retail at £13 each.

Commodore also offers a pair of paddles for £11.74 (plus VAT).

Stack supplies a light pen for the machine which works in both normal and hi-res modes, allowing interaction with the screen without using the keyboard, it costs £25.

Like the Pet the VIC-20 uses a specially made Commodore cassette recorder to load programs. It interfaces directly to the computer and includes a tape counter. The recorder uses standard cassettes and costs £44.95 (after VAT).

A single drive floppy disc unit for the VIC is available from Commodore. It has 174,848 bytes storage capacity and uses standard 5¼" single density floppy discs and costs £396 (after VAT).

The Vic printer's features include: 80 characters per line, a 30 character per second print speed, and double size graphics. It is a dot matrix printer and costs £230 (after VAT).

Stack produces a VIC-RS232 interface which will allow the computer to be connected to mainframe computers and act as a terminal or drive a daisywheel printer. It costs £49. A low-cost version of a bi-directional RS232 interface costs £17.25 and is also available from Stack.

Commodore's RS232C terminal type interface provides the opportunity to connect to telecommunications controllers and other computers it costs £34.95. Daisywheel printers can be interfaced to the computer via the Commodore IEEE-488 cartridge for £54.50.

Among Stack's other offerings are: a VIC games port cable adaptor which gives you two games port for joysticks and light pens; £17.25; a games port multiplexer needed for two joystick games, £33; and a VIC toolkit which includes hi-res graphics facilities and renumber and auto number features and costs £25 with a manual.

HARDCORE

A GAMES PLAYERS GUIDE TO THE VIC-20

FOR AND AGAINST

The VIC-20 has various bad points for the user. Other than the obvious 22 column problem there is a distinct lack of expansion sockets, any expansion being forced outside the computer. This implies buying expansive motherboards that aren't really performing any expansion themselves.

There are a few software nuisances such as input prompts being limited to 22 characters and extra scrolls when writing at the bottom of the screen.

The cassette storage system could be better. Load and verify errors are not logged until the end of a file and the data rate is no faster than normal audio techniques — the special system used by Commodore could be a lot faster without increasing errors.

In its defence, the VIC has good Basic, super graphics and is of good mechanical construction. The package seems excellent value for money being compatible with the Pet and having oodles of add-on peripherals.

The after sale support is alright considering that add-ons, software and literature are not really around yet. I had the misfortune to be caught up in the power unit recall by Commodore and their approach and speed in this matter could not be faulted.

All in all, an excellent machine and well worth its purchase.

PLUG-IN GAMES

One of the VIC-20's great gaming advantages over other computers is its plug-in cartridges.

Commodore is supporting the computer with a range of games programs recorded on cartridge which plug into the back of the machine and include enough extra memory for the unexpanded VIC to recreate popular arcade games.

These sell for £17.35 (plus VAT) and the range is expanding quickly. It includes a marvellously accurate copy of arcade space invaders (complete with 21-14 flying saucers) which sells under the name VIC Avenger. And just released a Packman game called Jelly Monsters which compares well with the arcade original.

Galaxians is to be found in this form as Star Battle and my own favourite is a Rally X variant called Rat Race. Also out are Alien, Road Race, Super Lander and Super Slot.

Due out soon in cartridge are a series of five Scott Adams Adventures, including: Adventure and Mission Impossible and an exciting and imaginative Pinball game.

Commodore has taken its time to bring these games out but it is aiming for a high quality rather than quantity and in the case of Avenger, Rat Race Jelly Monsters and Star Battle has succeeded in this aim.

Arfon Micro hopes to have a range of cartridges available for the VIC ready by this summer. Similar to the Commodore games cartridges and costing around £30, the Welsh firm has plans for a dozen games initially, including space invaders, Richochet and City Bomber.

WRITTEN WORDS

The time to write books on the VIC has been short but there is already a selection on sale rushed out to meet demand.

Getting Acquainted With Your VIC-20 is by Tim Hartnell, author of a book going by the same name for the ZX81. It costs £5.95 and is obtainable from Kuma Computers, 11 York Road, Maidenhead, Berkshire.

The VIC Revealed by Nick Hampshire is said by some buyers not to live up to its name, causing them confusion. It is published by Nick Hampshire Publications at PO Box, 13, Lysander Road, Yeovil, Somerset and costs £10.00.

Touching on machine code for those users interested in the subject is a book called **Assembly Language for VIC-20** by Dr P. Holmes, price £10.00. Copies can be obtained from the author by writing to 21 Colin Drive, London NW9 6ES. This 200 page book contains a 6502A instruction set, programs, exercises and an assembler listing.

At the beginner's end of programming try **Start With Basic on the Commodore VIC-20** which costs £4.95. Written by Don Munro and illustrated by Bill Tidy it is available from Tiny Publishing, 25, Beech Hill, Haywards Heath, Sussex.

Sigma Technical Press is planning to get in on the act and is in the process of compiling a book about the VIC-20 but precise details are not yet available.

Commodore publishes several books on the machine, including: Learn Compute Programming with the Commodore Vic b L. Carter and E. Huzan which costs £1.95 the **VIC-20 Programmer's Reference Guide** is by A. Finkel, N. Harris, P. Higginbottom and M. Tomczyk. It costs £14.95.

Commodore also produces books wit demonstration cassettes to help users ge the most out of the computer. Introductio to Basic (part 1) costs £14.95 and th Programmer's Aid Cartridge gives 20 extr command words to help make the pro grammer's life easier. It includes advice o using the function keys and includes AUTO TRACE, RENUMBER and MERGE com mands. It costs £34.95.

A Machine Code Monitor cartridge an book helps the user get to grips with 650 assembly language. It has assembl disassembly, hex dump, relocate, brea point and transfer among its features an costs £34.95.

SOFTWARE GLOSSARY

A beginner's guide to plain jargon

ADVENTURE: A type of game in which the player has to take a character role and retrieve a number of treasures or objects by a trial and error process giving instructions to the computer. The player encounters a variety of hazards often taking the form of dangerous monsters, wizards and animals. Some Adventure games are so complex that they take weeks or months to solve. Adventure games were originally written for massive mainframe computers.

ARRAY: A series of items — data or information — arranged to form a meaningful pattern.

BASIC: The most widespread computer language which is one of the easiest to learn and is used on all microcomputers.

BUG: A slang term given to a mistake in a computer program which prevents it from working. It can refer to a mechanical, electrical or electronic fault.

CHIP: A tiny piece of silicon which holds all the components which make up a microprocessor.

COMPUTER PROGRAM: A specified set of instructions which perform an operation or task for the computer user.

COMPUTER LANGUAGE: A language is used when writing programs and is vital for making the computer perform operations. A language consists of computer instructions or commands. There are different types of languages for carrying out different tasks.

CONCATENATION: To unite in a series, to form a link or a chain.

HARDWARE: The general term given to all pieces of electronic and mechanical devices which make up a computer system, i.e. the actual machines.

HIGH RESOLUTION GRAPHICS: Graphics which can be reproduced in great detail or to a high degree of accuracy.

KILOBYTE: A measurement of memory capacity. 1024 bytes of memory, so 8K is equivalent to 8192 bytes.

LOOP: A Basic function referring to the repeated execution of a series of instructions for a fixed number of times.

MACHINE CODE: The term used to refer to symbols or numbers assigned to parts of a machine. It is the same as operation code which is the symbol telling the computer which operation to perform. When a game is written in machine — sometimes known as assembly language — it speeds up the action.

MAINFRAME COMPUTER: The jargon word used to describe a very large computer capable of storing a vast amount of information in its memory banks.

MICROCOMPUTER: A tiny computer consisting of hardware and software. The main processing blocks are made of semiconductor integrated circuits.

MINICOMPUTER: A small computer system which gives higher performance than a microcomputer, costs more, has richer instruction sets and a proliferation of high level languages and operating systems.

OPERATING SYSTEM: Firstly, this can be used to describe an organised collection of techniques and procedures for operating a computer. Secondly, it refers to a part of a software package — the program or routine — defined to simplify procedures including input/output and data conversion routines.

PERIPHERALS: Equipment which is used with a computer system, e.g. printers, disc drives, and VDUs.

PSEUDOCODE: Computer instructions written in a symbolic language by the programmer which must be translated into machine language.

RAM (Random Access Memory): This is a memory chip which you can load programs and data to and from.

ROM (Read Only Memory): A memory chip which can only be read from but not written into after the initial data has been input.

ROUTINE: A set of coded computer instructions used for a particular function in a program.

SOFTWARE: Another name for computer programs. It can also refer to computer documentation.

STRUCTURED PROGRAMMING: A set of techniques designed to increase the reliability and comprehensibility of programming by making the programmer more disciplined.

SUBROUTINE: A computer program routine that is translated separately.

VDU (Visual Display Unit): A monitor, like a television, which is connected to a computer and is used to display information from the system's memory.

AD INDEX

the vic centre

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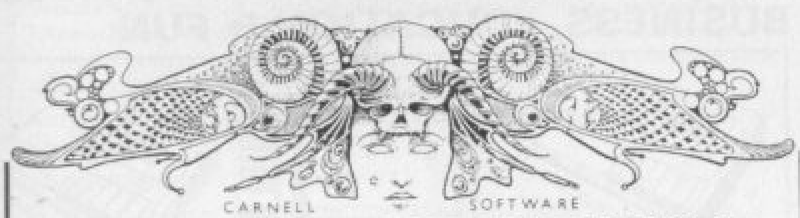
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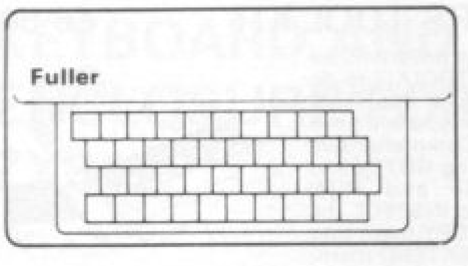
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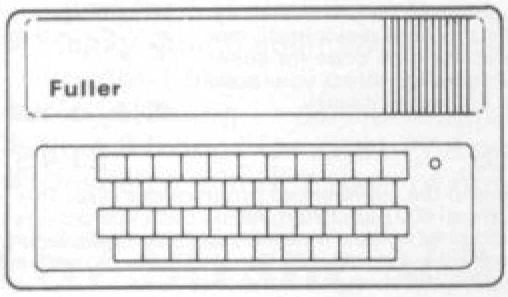
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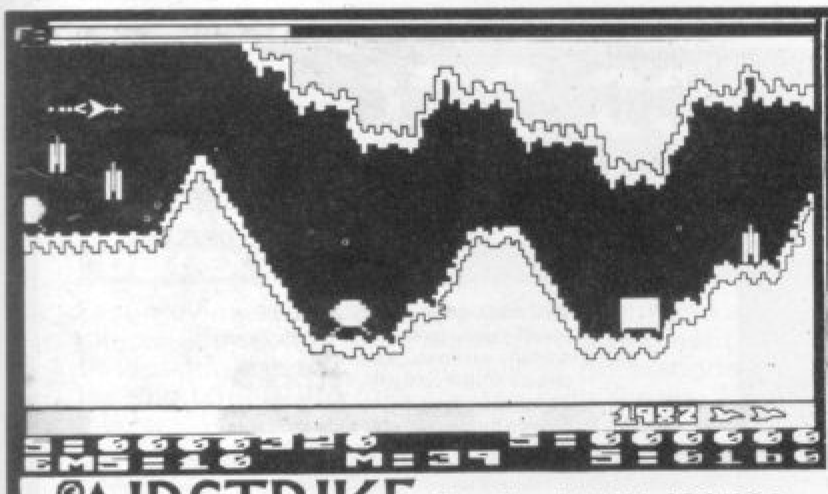


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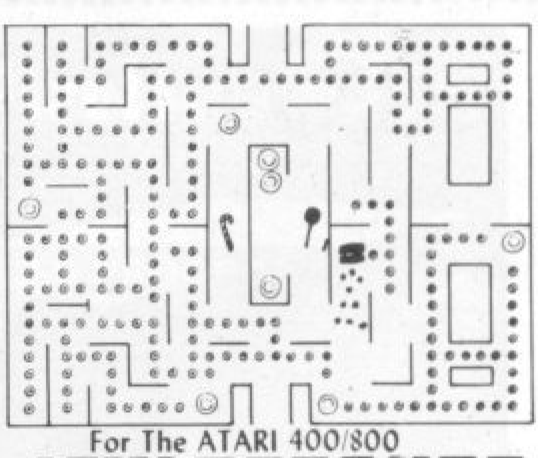
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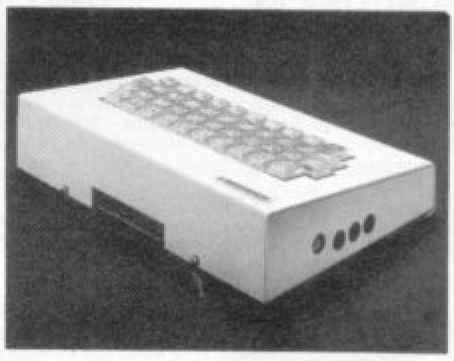
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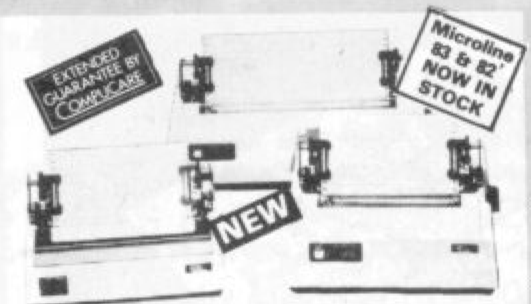
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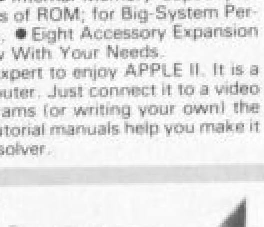
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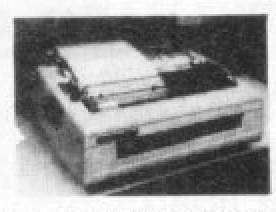
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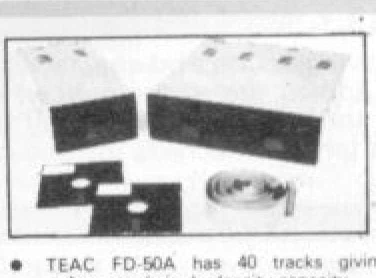
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It is late 1944, and the Allied Forces are sweeping towards Berlin. As General of your sector, you have at your command tanks, planes, artillery, infantry, engineers and vehicles — an awesome array of fighting men and the machines of war. From intelligence reports you know that the enemy General is a shrewd tactician, not to be under estimated. It will take planning and strategy to outwit this wily old campaigner.

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PROGRAM OF THE MONTH

TLDIS & DLDIS

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The printing of the disassembly may be temporarily halted by using ((SHIFT)) (just as in basic) or it may be ended by pressing the (BREAK)) key. It also has a comments column to display ASCII characters used in a LD or CP opcode.

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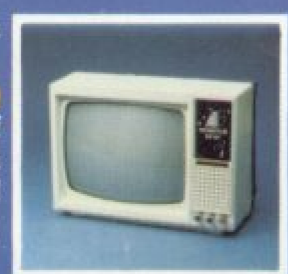
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